

No. 23-55805

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**IN THE UNITED STATES COURT OF APPEALS  
FOR THE NINTH CIRCUIT**

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VIRGINIA DUNCAN, ET AL.,  
*Plaintiffs and Appellees,*

v.

ROB BONTA, IN HIS OFFICIAL CAPACITY AS  
ATTORNEY GENERAL OF THE STATE OF CALIFORNIA,  
*Defendant and Appellant.*

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**On Appeal from the United States District Court  
for the Southern District of California**  
No. 3:17-cv-01017-BEN-JLB  
The Honorable Roger T. Benitez, Judge

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**APPELLANT'S EXCERPTS OF RECORD  
VOLUME 4 of 17**

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November 21, 2023

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13 IN THE UNITED STATES DISTRICT COURT

14

15 FOR THE SOUTHERN DISTRICT OF CALIFORNIA

16

VIRGINIA DUNCAN, et al.,

17

Plaintiffs,

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v.

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XAVIER BECERRA, in his official  
20 capacity as Attorney General of the  
21 State of California,

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Defendant.

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Case No: 17-cv-1017-BEN-JLB

**DECLARATION OF MARK  
HANISH IN SUPPORT OF  
PLAINTIFFS' SUPPLEMENTAL  
BRIEF; EXHIBITS 2-7**

1  
DECLARATION OF MARK HANISH

17cv1017

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1 I, Mark Hanish, declare as follows:

2       1. I am a firearm industry senior executive with over two decades worth of  
3 experience building indoor shooting ranges, running domestic and international sales  
4 and marketing departments for firearms, ammunition, and accessory companies,  
5 along with designing products with various engineering departments for the  
6 commercial, law enforcement, and military markets. I have also spent over 25 years  
7 as a professional shooter, holding several world, national and state level titles, using  
8 the firearms technologies that are relevant to this case.

9       2. I have been retained by the plaintiffs in this matter to provide a well-  
10 rounded industry perspective on firearms technology and the marketplace over the  
11 last twenty years, specifically as it relates to semi-automatic firearms with  
12 detachable magazines that are capable of holding over ten rounds. This report has  
13 been prepared for the supplemental briefing that was ordered following the 9th  
14 Circuit's remand in Virginia Duncan, et al. v. Rob Bonta. I have been retained to  
15 write a declaration at the rate of \$300/hour.

16 **Background and Qualifications**

17       3. I have spent the last twenty years as a firearms, ammunition, and  
18 defense industry executive. In addition to my role in the firearms industry, I have  
19 also been a professional shooter, competing in domestic and international matches in  
20 practical pistol and 3-gun for over 25 years.<sup>1</sup> I have a Bachelor of Science Degree in  
21 Entrepreneurship and Business Management from the W.P. Carey School of  
22 Business at Arizona State University. Through the Barrett Honors College, I wrote  
23 an Honor's Thesis for the basis of my first firearms training and supply business,  
24 whose growth led to the conceptualization of a luxury indoor shooting range. My  
25 partners and I founded the Scottsdale Gun Club, which at the time of the facility

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26  
27       1 3 Gun is a speed and accuracy sport, where the athlete uses the three platforms  
28 of semi-automatic firearms – rifles, pistols, and shotguns – all with what were  
considered large capacity magazines.

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1 opening (2004) was the world's largest and most luxurious public indoor range,  
2 creating a new market segment.

3       4. While developing the Scottsdale Gun Club, my partners and I operated  
4 The Armory gun store, which focused on self-defense and tactical products and  
5 training. My position was Founder and Vice President of Sales and Marketing for  
6 the Scottsdale Gun Club and at the time we created an entirely new model of high-  
7 end shooting and retail facilities. In addition to my sales and marketing roles, I was  
8 responsible for our product selection and purchasing. The Scottsdale Gun Club  
9 retained its tactical firearms and training roots and was nationally known as the  
10 leader in that category. We were doing such high volume in those categories we  
11 started a firearms and ammunition distribution business to resell products to other  
12 gun stores. Prominent firearms manufacturers would consult with me on their  
13 potential expansions into tactical market segments. Notably, we also launched a  
14 manufacturing brand, U.S. PALM, that developed and produced a line of high-tech  
15 polymer 30rd magazines for AK pattern rifles. These magazines are still  
16 manufactured and distributed nationwide.

17       5. In 2010, I transitioned from the dealer and distributor side of the  
18 industry into sales for FNH USA, LLC (later becoming FN America, LLC), which is  
19 a subsidiary of Fabrique Nationale out of Herstal, Belgium. In the South Carolina  
20 manufacturing facility FN has produced a multitude of arms for the US Military to  
21 include the M4, M16, M249, M240, and MK19. FN also began developing a robust  
22 commercial presence of which I was a part. Over six years, I rose to the position of  
23 Senior Director of Commercial Sales. I also was on the FNH USA professional  
24 shooting team. During my tenure at FN, I contributed to many aspects of the  
25 commercial business for US operations, including sales, product management,  
26 production forecasting, and marketing. At FN America we produced and marketed  
27 both pistol and rifle lines, almost all were sold with "large capacity" magazines as  
28 the standard offering. I have first-hand knowledge of the changes within the firearms

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1 industry market over the past several decades and I have been able to create  
2 consistent growth of the core business even in unstable market conditions. I worked  
3 closely with the production and engineering side of the company. With those  
4 departments, I principally directed the design for most models in the FN-15 line,  
5 working to define the market position and models for the consumer, which included  
6 both Law Enforcement and Commercial markets. The FN-15 is the company's AR-  
7 15 style line of rifles. Additionally, I conceptualized and worked with the team to  
8 design a high-end collector line of firearms, known as the Military Collector Series.  
9 These firearms included semi-automatic versions of American military issue  
10 firearms: the M4, the M16, and the M249 which generated over \$10million in  
11 revenue the first year of production.

12       6. In 2016, I became the Vice President of Sales and Marketing for  
13 Surefire, LLC, a company that specializes in tactical illumination devices, firearm  
14 suppressors, and "large capacity" magazines for AR-15 style rifles for the civilian,  
15 law enforcement, and military markets. At Surefire, I managed US commercial and  
16 law enforcement business. Internationally, I managed commercial, law enforcement  
17 and military markets. In 2019, I became the President of Global Sales and Marketing  
18 for Ammo Inc. and in just over 3 years sales increased from \$4M to \$240M. I was  
19 responsible for all sales, marketing, and product development activities including the  
20 design and development of specialty cartridges for US Special Operations  
21 Command. I successfully competed for and won several government contracts in a  
22 short period of time. AMMO acquired GunBroker.com, the largest internet  
23 marketplace for the firearms industry in 2021. In 2022, I joined the team at Timney  
24 Triggers as their Vice President of Sales, thanks in large part to my rich and well-  
25 rounded knowledge of the firearms industry. Due to my high-profile positions in a  
26 range of companies that directly impact the conversation about firearms technology  
27 available to the public and the military, as well as the ammunition side of the  
28 market. I am uniquely qualified to discuss this matter.

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1       7. As I have previously stated, not only is my experience in the industry as  
2 an executive, but as a shooter and collector. I have personal experience purchasing  
3 and using “large capacity magazines” prior to 1994 and continuing both throughout  
4 the entire 10 years of the federal ban. I also have an extensive background of  
5 practical application as a professional shooter. I have held multiple world, national,  
6 and state shooting titles across disciplines for over 25 years. Notably, I was a part of  
7 the 3 Gun National Pro Tour for six years, as a regular finalist and 2012 overall  
8 runner up. 3 Gun Nation was a television show that aired on NBC Sports and  
9 Sportsman Channel promoting the practical shooting use of semi-automatic rifles,  
10 pistols, and shotguns with “large capacity” magazines.

11      8. Due to my professional background within the firearms industry, I have  
12 served on the Board of the American Suppressor Association and have regularly  
13 appeared as an on-camera expert for the National Shooting Sports Foundation, the  
14 Outdoor Channel’s Gun Stories with Joe Mantegna, and Gallery of Guns TV. I have  
15 also been an industry guest speaker for college students at institutions such as the  
16 School of the Art Institute of Chicago and the W.P. Carey School of Business’ MBA  
17 Program.

18 **Scope of Work**

19      9. I have been asked to write this statement as a direct response to  
20 assertions made in Ryan Busse’s declaration for the supplemental briefing that was  
21 ordered following the 9th Circuit’s remand in Virginia Duncan, et al. v. Rob Bonta.  
22 In this document, I will provide a general statement on the popularity of AR-15 style  
23 and similar rifles and their popularization on the firearms market, with a specific  
24 emphasis on limitations in advertising and other avenues that contributed to this  
25 robust market. I will then discuss the importance of magazines to the fundamental  
26 operation of a semi-automatic firearm, as well as address their extensive use before  
27 and after 1994 and the ways in which manufacturers have responded to the changing  
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1 in legislation. I will conclude on a discussion surrounding the 1911 style semi-  
2 automatic pistol and its waning popularity in a defensive handgun market.

3       10. For the purposes of this report, I will use the terms “high capacity”  
4 magazine and “large capacity magazine” and the abbreviation “LCM”  
5 interchangeably to reference magazines capable of holding more than ten rounds. I  
6 use the terms as they relate to the ways in which Busse categorizes them in his  
7 declaration and the way they are defined in the Violent Crime Control and Law  
8 Enforcement Act (1994).

9 **AR-15 and Civilian Popularity**

10      11. The demand for AR-15s and similar rifles grew steadily since their  
11 inception and continued through the 1994-2004 federal “Assault Weapons Ban”  
12 (AWB). The Colt AR-15 first became available on the commercial market in 1964.  
13 In addition to the domestic production, throughout the 1970s and 1980s, semi-  
14 automatic rifles with “large capacity magazines”, similar in style and function, were  
15 imported into the United States for sale to the commercial market. These  
16 comparable rifles followed an overarching trend in firearms design towards smaller  
17 calibers with larger magazine capacities. A few notable examples of these were  
18 manufactured by Beretta, Daewoo, FN, HK, IMI, SIG, STEYR, as well as several  
19 AK pattern rifles. The importation of these foreign made rifles however was  
20 restricted in 1989. Domestic manufacturers such as Colt, Bushmaster, Olympic  
21 Arms, Pac-West Arms, Eagle Arms / Armalite, and DPMS that were previously  
22 building AR-15 style rifles continued, for the most part, with production of slightly  
23 modified rifles to comply with the new federal regulations. These rifles increased  
24 exponentially in popularity as more consumers became aware of them, as they have  
25 many benefits for a multitude of applications including personal defense, target  
26 shooting, competition, and hunting. The AR-15 style of rifle is lightweight, has low  
27 recoil, is relatively easy to learn how to use, can be customized by the consumer, and  
28 is easily adjustable to fit most users of varying sizes and physical abilities. During

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1 the AWB period, many companies were discouraged from investing in production  
2 capacity to enter the AR-15 style rifle market due to legislative uncertainty. In the  
3 years following the sunset of the AWB more recognizable brands such as Smith &  
4 Wesson, Ruger, Sig Sauer, FN, and Remington were willing to invest the capital and  
5 enter the market. These well-known and trusted brands responded to market demand  
6 for AR-15 style rifles manufactured by established companies.

7       12. There is a lot of debate surrounding the effectiveness of advertising and  
8 its impact on the consumer. In terms of firearms marketing, however, it is important  
9 to note that there are significant limitations on the manufacturer due to the nature of  
10 the product which must be considered when analyzing how successful and how  
11 much of an impact firearms industry marketing has actually had on consumer  
12 decision making.

13           Marketing and Advertising Limitations and Considerations

14       13. As a Senior Executive at one of the larger firearms manufacturers in the  
15 world, I have been responsible for determining the firearms product mix and  
16 production quantities based on the marketplace. Most manufacturers forecast their  
17 future sales, and corresponding production, to match the products and quantities  
18 their customers are demanding rather than the other way around. Its common sense  
19 to manufacture and deliver what your customers are asking to purchase. Beyond  
20 those core product sales, companies introduce new products to market that are either  
21 a variation of a core product, a direct response to new customer demand, or a totally  
22 new concept product. Consumer demand for the AR-15 style and similar rifles,  
23 along with “high capacity” magazines for both rifles and pistols, has been the market  
24 driver for the increased production and sales.

25       14. In Ryan Busse’s declaration, he asserts that the gun industry is  
26 responsible for collectively pushing AR-15 style rifles and “high capacity”  
27 magazines onto the market – a notion that fails to consider the myriad of factors that  
28 influence consumer purchasing behavior. There are many fine marketing

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1 professionals in the industry capable of creating innovative campaigns, but they still  
2 are forced to compete for consumer attention without access to most standard  
3 marketing avenues. Marketing is severely restricted and companies in the firearms  
4 industry are prohibited or limited when using typical services to sell to the  
5 consumers through means of television, Google Ads, e-commerce platforms,  
6 merchant payment processing services and mainstream social media (Facebook,  
7 Instagram, YouTube, etc). Without the ability to advertise via most technology,  
8 industry does its best to respond to consumer demand with antiquated feedback  
9 channels. Most firearms industry advertising is limited to endemic periodicals,  
10 limited cable television channels such as the Outdoor Channel, and websites visited  
11 directly by consumers or found through organic search results.

12       15. While firearms manufacturers have had restrictions imposed upon on  
13 their abilities to market, there are other factors to consider for the proliferation and  
14 popularity of the AR-15 and similar rifles that were completely outside of the scope  
15 of the industry. For example, the Global War on Terror (GWOT) starting in 2001  
16 produced images and video of American service members with their rifles and  
17 tactical gear, which was broadcast across major media outlets. In the early years of  
18 the war, the televised GWOT exposed the entire American consumer market to the  
19 likeness of the iconic Colt and FN M4/M16 fueling awareness of the semi-automatic  
20 commercial AR-15 style rifle. The War on Terror has continued for decades, and a  
21 generation of consumers, including service members, now desired to own AR-15  
22 style semi-automatic rifles. There is a long history of service rifles becoming  
23 familiar to the generation that used them in conflict, and the resulting desire to bring  
24 those rifles home from service and onto the shooting range and into the field for  
25 sporting uses.

26       16. However, the Hughes Amendment, a portion of the Firearm Owners'  
27 Protection Act of 1986, which essentially banned the civilian ownership of machine  
28 guns made after 1986, prevents this practice in some form from continuing. The

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1 military issued machine guns are no longer allowed to be transferred, but the desire  
 2 to own and use the issued rifles has not subsided. While in my role at FN America, I  
 3 directed the design and sales for most of the commercial FN15 model rifles.  
 4 Additionally, I was instrumental in creating and launching the Military Collector  
 5 Series consisting of the FN15 M4 (attached as **Exhibit 2**), FN15 M16 (**Exhibit 3**),  
 6 and FN M249s (**Exhibit 4**). This Military Collector Series was comprised of semi-  
 7 automatic replicas of the government issued M4, M16, and M249. These rifles were  
 8 exceptionally well received by general commercial customers and service members  
 9 desiring a replica of their issued rifle. The consumer demand for these rifles was  
 10 driven mainly by the customer's familiarity with the designs either through service  
 11 or media exposure.

12       17. Today the AR-15 style rifle is one of the most popular rifles in  
 13 America. However, that popularity was not just engineered by the firearms industry,  
 14 who have limited advertising channels. Rather, the popularity of this firearm has  
 15 more to do with the design's features, benefits, and adaptability to be well suited for  
 16 a wide array of legitimate uses. To quantify the acceptance and widespread adoption  
 17 of these rifles, it is of note that according to the 2021 National Firearms Survey  
 18 (expanded May 2022) about 24.6 million people, have owned an AR-15 or similarly  
 19 styled rifle, and up to 44 million such rifles have been owned.<sup>2</sup>

## 20 “Large Capacity Magazines” and the Firearms Market

21       18. In Busse's declaration, he asserts that “large capacity magazines”  
 22 (LCM) are only recently popular, which is a specious argument. In 1993, the year  
 23 prior to the 1994 federal ban, semi-automatic pistols accounted for 80% of handguns  
 24 produced in the US.<sup>3</sup> According to Christopher S. Koper in his 2004 Updated

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26       <sup>2</sup> English, William, 2021 National Firearms Survey: Updated Analysis Including  
 27 Types of Firearms Owned (May 13, 2022). Georgetown McDonough School of  
 Business Research Paper No. 4109494, Available at SSRN: <https://ssrn.com/abstract=4109494> or <http://dx.doi.org/10.2139/ssrn.4109494> (**Exhibit 5**)

28       <sup>3</sup> (Zawitz, 1995, p. 3) (**Exhibit 6**).

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1 Assessment of the Federal Assault Weapons Ban: Impacts on Gun Markets and Gun  
 2 Violence, 1994-2003 report “*Approximately 40 percent of the semiautomatic*  
 3 *handgun models and a majority of the semiautomatic rifle models being*  
 4 *manufactured and advertised prior to the ban were sold with LCMs or had a*  
 5 *variation that was sold with an LCM*”.<sup>4</sup> This study clearly illustrates the significance  
 6 of large capacity magazines on the market even before the Federal Assault Weapons  
 7 Ban. Today, that trend continues to grow. The 2021 National Firearms Survey  
 8 (expanded May 2022) reported:

9           48.0% of gun owners, about 39 million people, have owned  
 10 magazines that hold over 10 rounds, and up to 542 million such  
 11 magazines have been owned.<sup>5</sup>

12         19. As far as I am aware, the legal concept at the federal level of using the  
 13 arbitrary quantity of greater than 10 rounds to define a magazine as a “large capacity  
 14 ammunition feeding device” first appeared in the Violent Crime Control and Law  
 15 Enforcement Act of 1994. Since the inception of magazine fed firearms, designers  
 16 explored magazine designs and manufacturing methods to maximize intended  
 17 functionality and reliability of their firearms without arbitrary capacity limitations. It  
 18 wasn’t until restrictions were legally mandated did engineers modify or alter their  
 19 designs to conform to a random capacity limit. In order to comply with capacity  
 20 laws, manufacturers were compelled to redesign or modify existing standard  
 21 capacity magazines to limit their capacity to hold no more than 10rds, with severe  
 22 consequences if an 11<sup>th</sup> round can still be forced in the magazine. Often the  
 23 regulations are left ambiguous and subject to court interpretation after the fact as to  
 24 what constitutes a permanent modification preventing the magazine from being

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25                          <sup>4</sup> <https://www.ojp.gov/pdffiles1/nij/grants/204431.pdf>

26                          <sup>5</sup> English, William, 2021 National Firearms Survey: Updated Analysis Including  
 27 Types of Firearms Owned (May 13, 2022). Georgetown McDonough School of  
 28 Business Research Paper No. 4109494, Available at SSRN: <https://ssrn.com/abstract=4109494> or <http://dx.doi.org/10.2139/ssrn.4109494> (Exhibit 5)

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1 considered readily convertible back to standard capacity. Manufacturers make every  
2 effort to avoid exposing themselves and their customers to this legal risk. Reducing  
3 the standard capacity of a magazine to hold 10 or fewer rounds has been  
4 accomplished through a variety of methods, some of which result in a less than  
5 optimal magazine design while potentially introducing a higher risk of failure,  
6 increased costs, and often adding unnecessary complexity. Some of the methods  
7 used to reduce capacity include:

- 8 i. Narrowing of the internal width down the entire length of  
9 the magazine, altering the internal geometry from the  
original design intent.
- 10 ii. Creating indentations in the side of the magazine designed to  
11 limit the downward travel of the follower in the magazine  
12 tube. This method is sometimes coupled with weakening  
13 cuts made to the remainder of the circumference of the  
14 magazine tube adjacent to the indentations. In this design the  
15 magazine spring usually extends to the baseplate and is at  
risk of catching or hanging up on the indentations, impeding  
normal operation.
- 16 iii. Shortening the magazine tube in conjunction with designing  
17 a novel base pad that extends upward into the firearm to  
18 connect with and complete the magazine assembly. These  
19 base pads with magazine tube extender pieces are more  
20 complicated to use, costly to manufacture, and their  
21 increased complexity invites a possible reduction in  
structural integrity.
- 22 iv. Inserting an object into the magazine to limit follower travel  
23 and permanently attaching the base pad to encapsulate the  
24 object in the magazine tube.
- 25 v. Installing a pin or rivet through the exterior of the magazine  
26 body to limit the travel of the follower.

27 20. The burden on the manufacturers to produce these 10rd or less  
28 magazines was reduced with the sunset of the AWB in 2004. The few states

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1 remaining with their own capacity limits require manufacturers to continue to  
2 modify their products as described above to comply with the restrictions. This  
3 increases costs for manufacturers to design or redesign magazines, producing lower  
4 quantities of the restricted magazines that potentially don't reach the manufacturing  
5 amounts required to realize volume savings. Manufacturers may also choose not to  
6 offer the affected models for sale to the residents of the restrictive state, reducing the  
7 options for those residents to select from.

8 Magazines are an Integral Part of a Firearm

9       21. Magazine fed firearms are systems with many parts that must function  
10 together in order to operate properly, and the ammunition feeding device is critical  
11 to the overall performance and success of the firearm. To this day, especially in  
12 modern handguns, the magazine is often the cornerstone of the pistol design. Unless  
13 designing a new pistol to utilize an existing magazine, engineers will start a new  
14 pistol project with designing the magazine first. The ammunition feeding device  
15 must be optimized to reliably deliver cartridges into the operating system. The  
16 engineers must consider the dimensions of the cartridge, with specific attention to  
17 the cartridge case being either a straight wall or a tapered case, and angles at which  
18 the magazine presents cartridges to the action. The manner in which the magazine  
19 and action interface is critical. The remainder of the firearm design builds upon the  
20 foundation laid by the magazine's form. Many, if not most, modern pistols are built  
21 around a magazine designed to hold more than 10 rounds. Pistols designed for  
22 defensive use balance maximizing the number of rounds carried for personal  
23 protection within a size constraint of the pistol to perform its intended function.  
24 Even though subcompact pistols are designed primarily for concealment and safety  
25 while carrying, designers also attempt to maximize magazine capacity as well.  
26 Pistols designed for recreation, sport, and competition are usually designed to  
27 maximize capacity, accuracy, and reliability with few constraints on size.

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12  
DECLARATION OF MARK HANISH

17cv1017

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1       22. As an integral part of the firearm, magazines are required for proper  
2 function. While firearms are one of the few consumer items designed for several  
3 lifetimes of service, their magazines are an item that can degrade with use. In  
4 addition to the routine maintenance of replacing springs and worn followers, feed  
5 lips of magazines which hold the next round in position to be presented to the action,  
6 may both wear and crack from the cycling of the action. Magazines and their feed  
7 lips are also susceptible to bending, cracking, denting, or deforming and being  
8 rendered unserviceable when dropped during normal use. This is not uncommon,  
9 and therefore, not an exceptionally rare occurrence that would only affect high  
10 volume shooters.<sup>6</sup> Shooters run the risk of damaging a magazine every time they  
11 practice a reload and eject a magazine onto the ground.

12      23. A prudent firearms owner will purchase enough magazines to sustain  
13 the use of their firearm as intended over the remainder of their lifetime, accounting  
14 for damaged and worn-out magazines along the way. Many handguns and rifles have  
15 proprietary magazines that are specific to the manufacturer, product family, and  
16 many times the specific model. Replacement magazines may not be available in the  
17 future as there is no guarantee the manufacturer will be in business to support the  
18 platform, and there is no guarantee that an aftermarket company will produce that  
19 specific magazine. A firearm without a functional magazine is of little use to an  
20 owner, and of little value to another consumer. There is less risk for consumers that  
21 possess firearms capable of accepting a magazine with a somewhat standardized  
22 interface. These firearms are generally older legacy designs that were used in rifles  
23 and pistols adopted by militaries. Magazines for the AR-15 style rifles, AK pattern  
24 rifles, and model 1911 pistols fall into this category. Busse also asserts that one may  
25 simply purchase a kit to refurbish a previously owned magazine. This option has  
26 effectively been nullified as the possible enforcement of CA Penal Code Section

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28      <sup>6</sup> Busse Decl., ¶10.

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1 32311 regulating “conversion kits” has limited retailers from selling magazine repair  
 2 kits.<sup>7</sup> During the 1994-2004 AWB period, individual manufacturers would not sell  
 3 consumers all the magazine components required to build a new magazine. Many  
 4 would designate a single component of the magazine as their control item and refuse  
 5 to sell that item to consumers. Any consumer needing to repair a legally owned pre-  
 6 ban magazine was out of luck if they had broken or damaged the restricted part.

7       24. As previously stated, magazines are so critical to the firearm, engineers  
 8 often start the design of a new firearm around the magazine. Magazines are a highly  
 9 specialized item to manufacture, whether they are stamped and welded from steel or  
 10 aluminum, injection molded from an advanced polymer, or a combination of  
 11 stamped feed lip and mag catch parts over-molded into a polymer body. These  
 12 specific manufacturing processes require specialized equipment, skillsets, and  
 13 sometimes stabilized environments not found in most firearms manufacturing  
 14 facilities. Firearms manufacturers choose to utilize the services of highly skilled  
 15 outside vendors to deliver a superior product built to their design specifications  
 16 precisely because of the importance of the magazine in the overall system. As an  
 17 added benefit to all commercial, law enforcement, and military customers, these  
 18 specialized magazine companies have grown and matured and are far more capable  
 19 to produce significantly higher quality products for the entire marketplace.  
 20 Magazines built today are some of the most advanced magazines in history and as a  
 21 result, are structurally safer and more reliable for the end user. Gun barrels and other  
 22 critical components are also routinely outsourced to specialized manufacturers. For  
 23 example, a firearm manufacturer may specify a hammer forged barrel to meet safety

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24  
 25  
 26       7 [https://leginfo.legislature.ca.gov/faces/codes\\_displaySection.xhtml?lawCode=PEN&sectionNum=32311](https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PEN&sectionNum=32311). (b) For purposes of this section, a “large capacity  
 27 magazine conversion kit” is a device or combination of parts of a fully functioning  
 28 large-capacity magazine, including, but not limited to, the body, spring, follower,  
 and floor plate or end plate, capable of converting an ammunition feeding device  
 into a large-capacity magazine.

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1 and performance standards, and it would be absurd to contend the mere act of  
2 outsourcing somehow reduces the importance of the barrel.

3       25. The magazine is correctly considered an integral part of the firearm, not  
4 merely an accessory. It is considered such a vital part of the firearm that the  
5 magazine's value is included in the cost of the firearm for calculation of the  
6 Firearms and Ammunition Excise Tax (FAET) paid by the manufacturer or  
7 importer.<sup>8</sup> It is only additional magazines that are treated as non-taxable extra parts.  
8 To contrast, accessories, even if included with the firearm, are not subject to FAET.  
9 Typical examples of accessories include holsters, cleaning kits, gun locks, optics,  
10 and other accoutrement not critical to the function of the firearm.

11 **Consumer Demand and Defensive Pistol Selection**

12       26. In Busse's declaration he focuses heavily on the 1911 design as the  
13 basis for his claims that 7 or 8 rounds of .45 ACP is more than adequate for a pistol.  
14 This limited perspective is understandable given his career at one of the larger  
15 manufacturers of 1911 style pistols. However, there are a multitude of shortcomings  
16 with the anecdotal statements he employs to support his position. There are many  
17 pistols that are more effective for self-defense while offering a superior balance of  
18 reliability, affordability, and capacity. It is widely understood that most of the less  
19 expensive models of 1911s, and even many of the mid-level price point pistols in the  
20 \$1000-\$1500 range from companies like Colt and Kimber may require an additional  
21 investment in gunsmithing services to make them suitably reliable for defensive use.  
22 Many people cannot afford one of the higher priced 1911 pistols he espouses, nor  
23 can everyone handle the recoil of the .45 ACP and have the confidence to defend  
24 themselves with the 7 or 8 rounds Busse advocates. Persons of a smaller stature  
25 and/or having reduced strength may select a 1911 design pistol in 9mm for its  
26 reduced recoil, but in turn they are accepting the accompanying risk of using single

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27  
28       <sup>8</sup> <https://www.ttb.gov/images/pdfs/presentations/FAET-Return-Walkthrough.pdf>

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1 stack 9mm magazines which are inherently less reliable due to the tapered case of  
2 the 9mm cartridge. The century old 1911 design is also less intuitive and requires  
3 more familiarity and training for novice shooters to master. For these and other  
4 reasons, many of the leading firearms trainers in the country recommend a multitude  
5 of superior modern design pistol options for self-defense firearms.

6 27. Busse also claims the 1911 to be “still one of the most widely sold guns  
7 in the United States”. This claim might be referring to a wide geographic territory as  
8 the defining standard of sales, as the “high volumes” of the past cannot be favorably  
9 compared to current modern pistol sales. In comparing aggregated data on broad  
10 categories of self-defense pistols, the BATF&E’s 2020 Annual Firearms  
11 Manufacturing and Export Report does not give specific model information, but  
12 rather we can make inferences from the pistol category, which is broken down into  
13 caliber ranges. We find there were just shy of 3.9 million 9mm and .380 pistols  
14 manufactured in 2020, and in comparison, just over 705,000 pistols comprise the up  
15 to .50 caliber category.<sup>9</sup> This category includes all pistols chambered in .45 ACP, not  
16 just 1911s, as well as additional designs and calibers such as the .40 S&W, making  
17 the 1911 production somewhere below that ceiling. With further examination of the  
18 manufacturer’s individual reporting data, it is evident the market clearly indicates  
19 significantly higher demand for modern pistols in calibers smaller than .45 ACP.

20 28. Busse goes on to state that based on his experience, “a large-capacity  
21 magazine is not necessary to use a firearm effectively for self-defense or other  
22 sporting purpose, like hunting.” However, the 2021 National Firearms Survey  
23 (expanded May 2022) provides contrary information regarding the carry and use of  
24 firearms for self-defense. According to the Survey:

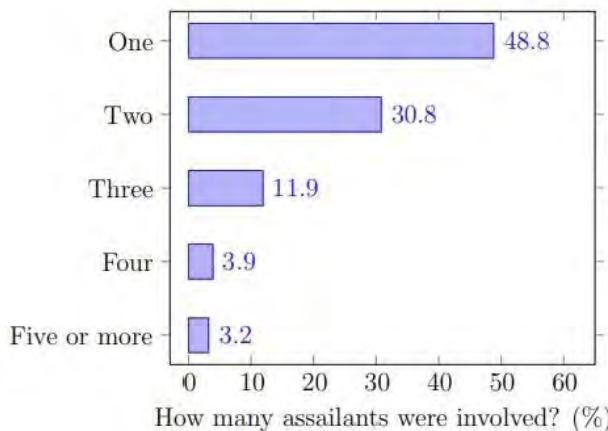
25 31.1% of gun owners, or approximately 25.3 million adult Americans,  
26 have used a gun in self-defense. Gun owners engage in approximately  
27 1.67 million defensive uses of firearms per year. Handguns are the  
28

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<sup>9</sup> 2022.06.10\_afmer\_2020\_cover\_sheet\_508 (1) (**Exhibit 7**).

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1 firearm most commonly used in defensive incidents (65.9%). The  
 2 majority of defensive gun uses take place outside of the home (74.8%).  
 3 About half of defensive gun uses involve more than one assailant  
 (51.2%).



12  
 13        29. Conclusions drawn in the survey state that “presumably, it would be  
 14 advantageous to have a firearm with a larger capacity magazine if one needed to  
 15 engage more than one assailant, which these responses suggest is indeed common.  
 16 Although in most defensive gun uses the gun was not fired (81.9%), we can further  
 17 analyze the subset of incidents in which a gun was fired. In 67.8% of these cases in  
 18 which a gun was fired in self-defense, multiple rounds were fired.”<sup>10</sup>

19 **Conclusion**

20        30. In this report, I have addressed several statements made in Ryan  
 21 Busse’s declaration. It is my findings, as an industry expert with a range of  
 22 backgrounds in the tactical firearms market and culture, that several factors  
 23 contributed to the popularity of the AR-15 style and comparable rifles starting in the  
 24 1960s and that this phenomenon is not solely the result of an industry marketing

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25  
 26  
 27        <sup>10</sup> English, William, 2021 National Firearms Survey: Updated Analysis Including  
 28 Types of Firearms Owned (May 13, 2022). Georgetown McDonough School of  
 Business Research Paper No. 4109494, Available at SSRN: <https://ssrn.com/abstract=4109494> or <http://dx.doi.org/10.2139/ssrn.4109494> (Exhibit 5)

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1 scheme. Furthermore, I conclude that large capacity magazines have been popular  
2 since well before their 1994 regulation and rebut the assertion that these magazines  
3 are not ubiquitous. Additionally, I provided a perspective on the importance of a  
4 magazine to firearms design as well as ways in which the industry have improved  
5 these magazines to be of superior technology ultimately being fundamentally safer. I  
6 finish the report with an analysis on the proliferation of self defense handguns that  
7 have far surpassed the production and popularity of the 1911 style design in today's  
8 gun ownership community.

9 I declare under penalty of perjury that the foregoing is true and correct.

10 Executed within the United States on November 30<sup>th</sup>, 2022.

11 \_\_\_\_\_  
12 Mark Hanish  
13 Declarant  
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# EXHIBIT 2

**ER\_714**



# FN 15™ M4 MILITARY COLLECTOR

THE WORLD'S MOST BATTLE-PROVEN FIREARMS™

CARBINES

FN 15™ SERIES



## FN 15™ M4 MILITARY COLLECTOR

**5.56x45mm CALIBER**   **30 Rd. MAGAZINE**   **6.6 LBS. WEIGHT**   **30.5"-34.2" LENGTH**   **16" BARREL LENGTH**

**OPERATION:** DIRECT IMPINGEMENT

**FINISH:** BLACK

**SIGHTS:** A2-STYLE FRONT, ADJUSTABLE REAR SIGHT

The FN 15™ Military Collector Series brings to market military replica rifles made to FN's exacting specifications.

The semi-automatic rifles are chambered in 5.56x45mm NATO and feature M4 -profile 16 and 20-inch 1:7" RH, button broached and chrome-lined barrels, respectively. Each UID-labeled lower receiver is equipped with an ambidextrous selector switch, just like its select-fire big brother.

### PRIMARY FEATURES

Knights Armament M4RAS Adapter rail  
w/ rail adapter covers  
Ambidextrous safety lever

### RECEIVER

Hard-anodized aluminum  
Flat-top receiver, M-1913  
MIL-STD rail at the 12 o'clock position  
A2-style front sight, adjustable rear sight  
UID Label

### BARREL

16" Button-broached, chrome-lined  
A2-style compensator (Permanently attached)  
1:7" RH twist

### STOCK

Collapsible, 6-position with sling mount  
M4 with pistol grip

### OPERATING CONTROLS

Ambidextrous safety lever  
Ergonomic magazine release  
Forward assist

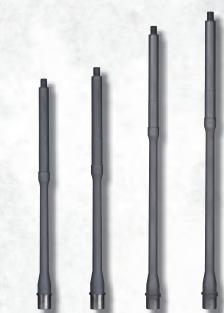
### MAGAZINE

Aluminum body, Low friction follower,  
AR-style 30 round capacity

### ACCESSORIES



FN UNIVERSAL  
TACTICAL SLING



FN PREMIUM COLD HAMMER-  
FORGED AR-15 BARRELS

| Product  | Designation                     | Product Type    | UPC          |
|----------|---------------------------------|-----------------|--------------|
| 36318    | FN 15™ M4 Military Collector    | Consumer        | 845737006211 |
| 36318-02 | FN 15™ M4 Military Collector LE | Law Enforcement | TBD          |

FOR MORE INFORMATION, CONTACT YOUR LOCAL FIREARMS RETAILER OR VISIT FNAMERICA.COM

ER\_715

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# EXHIBIT 3

**ER\_716**



# FN 15™ M16 MILITARY COLLECTOR

THE WORLD'S MOST BATTLE-PROVEN FIREARMS™

CARBINES

FN 15™ SERIES



The FN 15™ Military Collector Series M4 and M16 bring to market military replica rifles made to FN's exacting specifications. The semi-automatic rifles are chambered in 5.56x45mm NATO and feature M4 -profile 16 and 20-inch 1:7" RH, button broached and chrome-lined barrels, respectively. Each UID-labeled lower receiver is equipped with an ambidextrous selector switch, just like its select-fire big brother.

## PRIMARY FEATURES

Knights Armament M5RAS Adapter rail  
w/ rail adapter covers

Ambidextrous safety lever

## RECEIVER

Hard-anodized aluminum

Flat-top receiver, M-1913

MIL-STD rail at the 12 o'clock position

A2-style front sight, adjustable rear sight

UID Label

## BARREL

20" Button-broached, chrome-lined

A2-style compensator

1:7" RH twist

## STOCK

Fixed, A2 Rifle Butt-Stock

M16 with pistol grip

## OPERATING CONTROLS

Ambidextrous safety lever

Ergonomic magazine release

Forward assist

## MAGAZINE

Aluminum body, Low friction follower,  
AR-style 30 round capacity

## FN 15™ M16 MILITARY COLLECTOR

5.56x45mm  
CALIBER      30 Rd.  
MAGAZINE      8.2 LBS.  
WEIGHT      39.5"  
LENGTH      20"  
BARREL LENGTH

OPERATION: DIRECT IMPINGEMENT

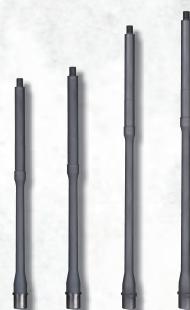
FINISH: BLACK

SIGHTS: A2-STYLE FRONT, ADJUSTABLE REAR SIGHT

## ACCESSORIES



FN UNIVERSAL  
TACTICAL SLING



FN PREMIUM COLD HAMMER-  
FORGED AR-15 BARRELS

| Product  | Designation                      | Product Type    | UPC          |
|----------|----------------------------------|-----------------|--------------|
| 36320    | FN 15™ M16 Military Collector    | Consumer        | 845737005061 |
| 36320-02 | FN 15™ M16 Military Collector LE | Law Enforcement | TBD          |

FOR MORE INFORMATION, CONTACT YOUR LOCAL FIREARMS RETAILER OR VISIT FNAMERICA.COM

ER\_717

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# EXHIBIT 4

ER\_718



# FN M249S®



RIFLE

FN M249S®

## FN M249S® STANDARD

**5.56x45mm** CALIBER   **30/200 Rd.** CAPACITY   **17.2 LBS.** WEIGHT   **40.7"** LENGTH   **18.5"** BARREL LENGTH

## FN M249S® PARA

**5.56x45mm** CALIBER   **30/200 Rd.** CAPACITY   **16.9 LBS.** WEIGHT   **31.5-37"** LENGTH   **16.1"** BARREL LENGTH

**OPERATION:** SEMI-AUTOMATIC, CLOSED BOLT

**FINISH:** BLACK OR FDE

**SIGHTS:** STEEL, ADJUSTABLE TO 1,000 METERS

## PRIMARY FEATURES

Semi-automatic, closed-bolt operation  
Primary sights graduated to 1000 meters with MIL-STD 1913 rail system for optics  
Quick change barrel and integral steel bipod

## RECEIVER

Formed steel frame with magazine well for alternate feed  
Fixed, pivoting ejector for robust ejection  
Top cover integrated MIL -STD 1913 mounting rail for sighting systems

## BARREL

Changeable barrel  
Cold hammer-forged steel  
Chrome-lined bore and chamber  
Heat shield and carry handle included

## STOCK

STANDARD - Highly ergonomic polymer buttstock assembly with hydraulic recoil buffer system and non-slip buttplate  
PARA - Rotating, telescoping buttstock with hydraulic recoil buffer and non-slip buttplate

## OPERATING CONTROLS

Crossbolt safety  
Curved trigger for improved finger position and control  
Non-reciprocating charging handle

## FEED SYSTEM

Standard disintegrating link belt-fed  
Under-mounted polymer ammunition container helps keep ammunition cleaner for reduced wear and added reliability

The FN M249S Standard and Para, semi-automatic versions of the M249 SAW light machine gun, originally developed by FN Herstal as the FN MINIMI® and adopted by the U.S. Military in 1988. Features the signature FN cold hammer-forged, chrome-lined barrel and operates from a closed bolt position. Chambered in 5.56x45mm NATO, the rifle will accept both magazine and linked belt ammunition.

| Product   | Designation          | UPC          |
|-----------|----------------------|--------------|
| 46-100169 | M249S Standard Black | 845737015077 |
| 46-100170 | M249S Standard FDE   | 845737015091 |
| 46-100171 | M249S Para Black     | 845737015084 |
| 46-100172 | M249S Para FDE       | 845737015107 |

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# EXHIBIT 5

**ER\_720**

# 2021 National Firearms Survey: Updated Analysis

## Including Types of Firearms Owned

William English, PhD

Georgetown University

Expanded Report: May 13, 2022

### Abstract

This report summarizes the findings of a national survey of firearms ownership and use conducted between February 17th and March 23rd, 2021 by the professional survey firm Centiment. This survey, which is part of a larger book project, aims to provide the most comprehensive assessment of firearms ownership and use patterns in America to date. This online survey was administered to a representative sample of approximately fifty-four thousand U.S. residents aged 18 and over, and it identified 16,708 gun owners who were, in turn, asked in-depth questions about their ownership and their use of firearms, including defensive uses of firearms.

Consistent with other recent survey research, the survey finds an overall rate of adult firearm ownership of 31.9%, suggesting that in excess of 81.4 million Americans aged 18 and over own firearms. The survey further finds that approximately a third of gun owners (31.1%) have used a firearm to defend themselves or their property, often on more than one occasion, and it estimates that guns are used defensively by firearms owners in approximately 1.67 million incidents per year. Handguns are the most common firearm employed for self-defense (used in 65.9% of defensive incidents), and in most defensive incidents (81.9%) no shot was fired. Approximately a quarter (25.2%) of defensive incidents occurred within the gun owner's home, and approximately half (53.9%) occurred outside their home, but on their property. About one out of ten (9.1%) defensive gun uses occurred in public, and about one out of thirty (3.2%) occurred at work.

A majority of gun owners (56.2%) indicate that they carry a handgun for self-defense in at least some circumstances, and about 35% of gun owners report carrying a handgun with some frequency. We estimate that approximately 20.7 million gun owners (26.3%) carry a handgun in public under a "concealed carry" regime; and 34.9% of gun owners report that there have been instances in which they had wanted to carry a handgun for self-defense, but local rules did not allow them to carry.

The average gun owner owns about 5 firearms, and handguns are the most common type of firearm owned. 48.0% of gun owners – about 39 million individuals – have

owned magazines that hold over 10 rounds (up to 542 million such magazines in total), and 30.2% of gun owners – about 24.6 million individuals – have owned an AR-15 or similarly styled rifle (up to 44 million such rifles in total). Demographically, gun owners are diverse. 42.2% are female and 57.8% are male. Approximately 25.4% of Blacks own firearms, 28.3% of Hispanics own firearms, 19.4% of Asians own firearms, and 34.3% of Whites own firearms. In total, Americans own over 415 million firearms, consisting of approximately 171 million handguns, 146 million rifles, and 98 million shotguns.

## 1 Introduction

This report summarizes the main findings of a national survey of firearms ownership and use conducted between February 17th and March 23rd, 2021 by the professional survey firm Centiment. This survey, which is part of a larger book project, aims to provide the most comprehensive assessment of firearms ownership and use patterns in America to date.

Before this survey, the most authoritative resource for estimating details of gun ownership in the U.S. has been the “Comprehensive National Survey on Firearms Ownership and Use” conducted by Cook and Ludwig in 1994 (Cook and Ludwig, 1996), and the most authoritative resource for estimating defensive gun use in the U.S. has been the “National Self-Defense Survey” conducted by Kleck and Gertz in 1993 (Kleck and Gertz, 1995, 1998). While valuable resources, they are both now a quarter century old, and no surveys of similar scope and depth have documented firearms ownership and use in more recent years.

Hepburn et al. (2007) conducted a more limited survey to ascertain the “gun stock” in 2004, a version of which was repeated in 2015 (Azrael et al., 2017). However, as they explain in introducing their latter survey, data sources on firearms ownership and use remain scarce:

Although the National Opinion Research Center’s General Social Survey and other surveys have asked respondents whether they personally own a firearm or live in a home with firearms, few have asked about the number of guns respondents own, let alone more detailed information about these firearms and the people who own them, such as reasons for firearm ownership, where firearms were acquired, how much firearms cost, whether they are carried in public, and how they are stored at home (Smith and Son 2015; Gallup 2016; Morin 2014). Because of this, the best and most widely cited estimates of the number of firearms

in civilian hands are derived from two national surveys dedicated to producing detailed, disaggregated, estimates of the U.S. gun stock, one conducted in 1994, the other in 2004 (Cook and Ludwig 1997, 1996; Hepburn et al. 2007).

Miller, Zhang, and Azrael conducted an expanded survey in 2021 of 5,932 gun owners with a focus on characterizing the demographics of those who acquired firearms for the first time during the COVID-19 Pandemic, based on a sub-sample of 447 individuals who fit this criterion (Miller et al., 2022). This team also described their survey as a “2021 National Firearms Survey,” and it is helpful to clarify that their survey was distinct from the survey reported here.

Richer survey data on firearms ownership and use has been collected by industry associations such as the National Shooting Sports Foundation (NSSF).<sup>1</sup> However, these surveys generally aim at assessing industry trends and market segmentation and are not necessarily designed to be nationally representative. In 2017, the Pew Research Center conducted one of the most recent and detailed surveys of the demographics of gun ownership (Brown, 2017).<sup>2</sup> Although it did not ask detailed questions concerning defensive use of firearms and the types of firearms owned, this recent Pew survey serves as a helpful benchmark for corroborating the general ownership estimates of the present survey.

Advances in survey research technologies make it possible to reach large, representative respondent populations today at a much lower cost than a quarter century ago. One of the limitations of the Cook and Ludwig survey, which sought to be nationally representative, was that the survey sample was relatively small, with about 2,500 respondents of whom only about 600, or (24.6%), owned a firearm when the survey was administered. As the investigators noted in their report, some sub-questions were not sufficiently well powered to make confident inferences, particularly concerning the defensive use of firearms. Similarly, Kleck and Gertz’s survey was limited to 4,977 respondents, and the more recent surveys by Pew, Hepburn, and Azrael are all based on less than 4,000 respondents.

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<sup>1</sup>See <https://www.nssf.org/research/>

<sup>2</sup>See Pew Research Center, June 2017, “America’s Complex Relationship With Guns” <https://www.pewresearch.org/social-trends/wp-content/uploads/sites/3/2017/06/Guns-Report-FOR-WEBSITE-PDF-6-21.pdf>

Today, professional survey firms like Centiment<sup>3</sup> cultivate large pools of survey respondents, enabling representative sampling, and have techniques that encourage high response and completion rates while also ensuring the integrity of responses.<sup>4</sup> The online survey summarized here was presented to a nationally representative sample (excluding residents of Vermont who had already responded to a pilot version of this survey) of 54,244 individuals aged 18 or over who completed an initial questionnaire that included an indirect question indicating whether they owned a firearm (respondents were presented with a list of items commonly owned for outdoor recreational purposes, including firearms, and were asked to select all items that they own).

This question identified 16,708 individuals as gun owners, who were then transferred to the main survey, which then asked detailed questions about their ownership and use of firearms. Given the length and detail of the survey, there was a slight amount of attrition, as 7.5%, or 1,258 individuals, did not make it through all questions to the end of the survey. However, 92.5% of the responding firearms owners (15,450) did proceed through all of the survey questions.

This survey thus contains what we believe is the largest sample of firearms owners ever queried about their firearms ownership and firearms use in a scientific survey in the United States. This survey was approved by Georgetown University's Institutional Review Board. Of note, this survey was conducted just after a period of widespread social unrest across the U.S. and a contentious presidential election, which background check data suggests led to record gun sales (approximately 39.7 million in 2020, up 40% from the prior year).<sup>5</sup> It is thus a comprehensive and timely assessment of the state of firearms ownership and use in the United States. Finally, the extraordinarily large size of this sample enables us to make well-powered, statistically informative inferences within individual states, which considerably extends the value of this data.

The initial sample of respondents achieved excellent demographic representation across

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<sup>3</sup>See <https://www.centiment.co/>

<sup>4</sup>See <https://help.centiment.co/how-we-safeguard-your-data>

<sup>5</sup>See McIntyre, Douglas A. "Guns in America: Nearly 40 million guns were purchased legally in 2020 and another 4.1 million bought in January" <https://www.usatoday.com/story/money/2021/02/10/this-is-how-many-guns-were-sold-in-all-50-states/43371461/>

all 49 states and DC, excluding Vermont (see Appendix A and B). For the purpose of estimating firearms ownership rates for the general U.S. population we employed raked weighting on gender, income, age, race, and state of residence. Note that there was a brief period in the first two days after the soft launch of the survey that comprehensive demographic data was not collected from those respondents who did not indicate firearms ownership, and thus did not proceed to the main survey (approximately 300 respondents). Although the survey company, Centiment, maintained demographic data on these panel respondents, it was determined that this data was not as comprehensive as the data collected by the survey, at which point the demographic questions were moved to the front of the survey, and asked of all respondents, including those who did not indicate firearms ownership. For the purpose of calculating statistics on national firearms ownership rates, we exclude the entire sample of both firearms owners and non-firearms owners from these first two days (410 respondents), leaving us with 53,834 respondents after this date for whom we have comprehensive demographic data. Firearms-owning respondents from the first two days are included in subsequent analysis of firearms owners, and we do possess comprehensive demographic information for these individuals.

Appendix B contains tables reporting the demographic sampling rates and the Census demographics used for raked weighting of the national survey. Note that the overall effect of weights is minimal given the high representativeness of the initial sample. For the purposes of analyzing responses within the sub-sample of firearms owners, we do not employ weighting schemes, in part because the “true” demographics of gun ownership are not knowable from an authoritative source analogous to the U.S. Census Bureau. However, as a robustness exercise, using weights based on estimates derived from the larger survey response rates yields results that are substantially identical for the analysis of responses from firearms owners.

One of the challenges in asking questions about firearms is eliciting truthful responses from firearms owners who may be hesitant to reveal information about practices that are associated with public controversy. The “tendency to respond to questions in a socially acceptable direction” when answering surveys is often referred to as “social desirability bias” (Spector, 2004), and there is evidence that it can influence survey responses to questions regarding firearms. For example, when Rafferty et al. (1995) conducted a telephone survey

of Michigan residents who had purchased a hunting license or registered a handgun, only 87.3 percent of the handgun registrants and 89.7 percent of hunting license holders reported having a gun in their household. Similarly, Ludwig et al. (1998) have documented a large gender gap in reporting of firearms ownership, finding that “in telephone surveys, the rate of household gun ownership reported by husbands exceeded wives’ reports by an average of 12 percentage points.” Asking questions via an anonymous survey instrument on the internet is likely to cause less concern or worry than traditional phone-based questionnaires with a live person on the other end or during face-to-face interviews, which is how the General Social Survey – one of the most prominent national surveys that regularly asks about firearm ownership – is conducted.<sup>6</sup> Even when presented in the more impersonal setting of a computer interface, however, a survey must be worded thoughtfully so as to assure anonymity, and not give respondents reason to worry about answering truthfully.

This survey employs five common devices to encourage more truthful responses. First, it uses an indirect “teaser” question to pre-screen respondents in order to select those who own firearms. The initial question prompt presents the survey as concerned with “recreational opportunities and related public policies” and asks respondents if they own any of the following items, presented in a random order: Bicycle, Canoe or Kayak, Firearm, Rock Climbing Equipment, None of the Above. Only those who select “Firearm” are then presented the full survey. We also ask demographic questions at the outset, which allows us to assess the representativeness of the sample, including those who do not indicate firearms ownership. Second, the survey was carefully phrased so as to not suggest animus towards gun owners or ignorance of firearms-related terminology. Third, the survey assures respondents of anonymity. Fourth, in order to ensure that respondents are reading the survey questions carefully, and then responding with considered answers thereto, a “disqualifying” question (sometimes referred to as a “screening” question) was embedded a little over half of the way through the survey instructing respondents to select a particular answer for that question, which only those who read the question in its entirety would understand. Anyone registering an incorrect answer to this question was disqualified from the survey and their responses to

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<sup>6</sup>For a description of the methods of the General Social Survey see: [https://www.nsf.gov/pubs/2007/nsf0748/nsf0748\\_3.pdf](https://www.nsf.gov/pubs/2007/nsf0748/nsf0748_3.pdf)

any of the survey questions were neither considered nor tallied.

Finally, while responses were required for basic demographic questions, if questions of a sensitive nature were left blank, the software would first call attention to the blank response and prompt the respondent to enter a response. However, if a respondent persisted in not responding and again tried to progress, rather than kick them out of the survey, they would be allowed to progress to the next section in the interest of obtaining the maximum amount of information that they were willing to share. Respondents were not made aware of this possibility in advance, and in practice such “opting out” of a particular question was seldom done (less than 1% of responses for the average question). This is the reason that small variations are sometimes observed in the total number of respondents for certain questions.

A pilot version of this survey was first fielded in Vermont as part of a research project aimed at documenting firearms ownership and firearms use rates in that specific state. The Vermont survey served as a proof of concept for the national version, demonstrating that this survey is a viable instrument for eliciting responses from firearms owners with both high response rates and low disqualification rates. The results of the Vermont survey are presented separately in Appendix A of this report and closely mirror national results.

This report focuses on providing descriptive statistics of answers to the major questions asked in the survey. Future research will examine responses, and relationships between them, in more detail. The report proceeds as follows: the next (second) section summarizes national firearms ownership estimates and demographics; the third section examines defensive uses of firearms; the fourth section examines question regarding carrying for self-defense; the fifth section summarizes ownership statistics, and the sixth section concludes.

## 2 Gun Ownership Demographics

- About a third of adults in the U.S. report owning a firearm, totaling about 81.4 million adult gun owners.
- 57.8% of gun owners are male, 42.2% are female.
- 25.4% of Blacks own firearms.

- 28.3% of Hispanics own firearms.
- 19.4% of Asians own firearms.
- 34.3% of Whites own firearms.

With raked weighting employed for gender, state, income, race, and age we find that 32.5% of US adults age 21 and over own a firearm (95% Confidence Interval, 32.1 - 32.9%). Expanding the sample population to include those age 18-20, who are restricted in some states from purchasing firearms, 31.9% of US adults age 18 and over own firearms (95% Confidence Interval, 31.5% - 32.3%). This is slightly above, but consistent with, the most recent in-depth survey of firearms ownership conducted by Pew in 2017 before the Covid-19 pandemic, which found that 30% of adults in America own a firearm (Brown, 2017). It is also consistent with recent Gallup polling in 2020 and 2021, which found that 32% and 31% of adults personally own a firearm (Gallup, 2021).

As a benchmark to assess the accuracy of the teaser question used to ascertain firearm ownership, we can also compare ownership rates of other items reported by respondents for this question. We find 52% of respondents indicating owning a bicycle, which closely matches Pew's finding that 53% of Americans own a bicycle, according to a poll conducted in 2014.<sup>7</sup>

The distribution of gun owners surveyed by state is illustrated in Figure 1, and ranges from 1,287 in California and 1,264 in Texas to 26 in Washington, DC and 24 in North Dakota.

Table 1 shows the proportion of the population in each state estimated to own a firearm. Massachusetts, Hawaii, Rhode Island, and New Jersey have the lowest rates of ownership with less than 20% of the adult population owning firearms, while Kentucky, Montana, West Virginia, and Idaho have the highest rates of ownership with more than 45% of the adult population owning firearms.

With regard to the demographics of gun ownership, we find that 57.8% of gun owners are male and 42.2% are female, the average age of gun owners is 46-50 years old, and the average annual household income is \$80,000-\$90,000. Approximately 18% of gun owners do not identify as White (alone). Overall, approximately 10.6% of gun owners identify as Black,

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<sup>7</sup>See <https://www.pewresearch.org/fact-tank/2015/04/16/car-bike-or-motorcycle-depends-on-where-you-live/>

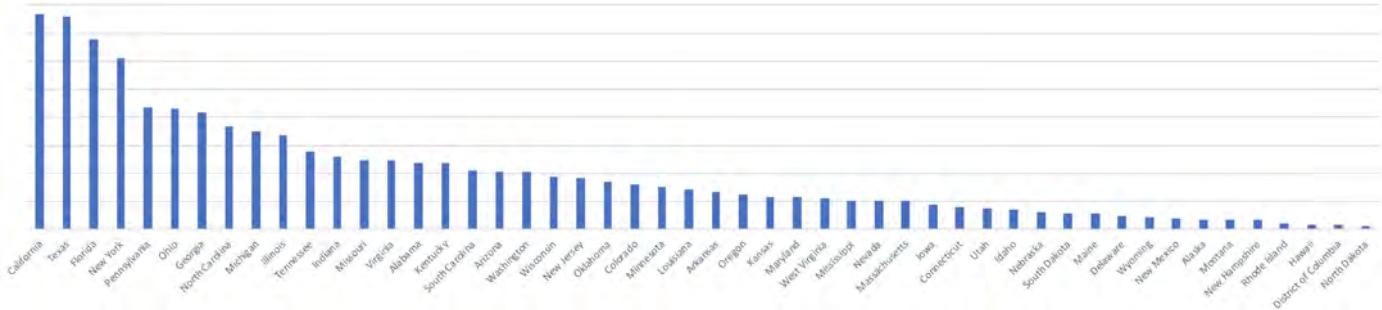


Figure 1: Distribution of Firearms Owners Surveyed

3.6% identify as Asian, 1.6% identify as American Indian, .2% identify as Pacific Islander, 82.0% identify as White, and 2.0% identify as Other. When analyzed within racial groups, we find that 25.4% of Blacks own firearms, 28.3% of Hispanics own firearms, 19.4% of Asians own firearms, and 34.3% of Whites own firearms.

According to the latest (2019) census estimates, there are approximately 255,200,373 individuals age 18 and over in the U.S., which implies that there are about 81.4 million adult gun owners.<sup>8</sup> Note that this figure does not include those under the age of 18 who may use or possess firearms for purposes such as hunting or shooting sports.

In sum, firearms ownership is widespread, and firearms owners are diverse.

### 3 Defensive Use of Firearms

- 31.1% of gun owners, or approximately 25.3 million adult Americans, have used a gun in self-defense.
- In most cases (81.9%) the gun is not fired.
- Gun owners engage in approximately 1.67 million defensive uses of firearms per year.
- The majority of defensive gun uses take place outside of the home (74.8%).

<sup>8</sup>Census date is available at <https://www2.census.gov/programs-surveys/popest/tables/2010-2019/national/asrh/nc-est2019-syasexn.xlsx>

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| State                | Proportion of adult population estimated to own firearms | 95% Confidence Interval |
|----------------------|--|-------------------------|
| Alabama              | 39.6%  | 35.2% – 44.1%           |
| Alaska               | 33.4%  | 25.7% – 42.1%           |
| Arizona              | 32.0%  | 28.8% – 35.4%           |
| Arkansas             | 36.6%  | 31.1% – 42.5%           |
| California           | 25.5%  | 24.0% – 27.0%           |
| Colorado             | 33.6%  | 29.8% – 37.7%           |
| Connecticut          | 20.2%  | 16.8% – 24.1%           |
| Delaware             | 24.7%  | 18.9% – 31.6%           |
| District of Columbia | 23.9%  | 15.6% – 34.9%           |
| Florida              | 30.3%  | 28.5% – 32.2%           |
| Georgia              | 37.1%  | 34.5% – 39.9%           |
| Hawaii               | 16.4%  | 10.6% – 24.5%           |
| Idaho                | 54.5%  | 45.5% – 63.1%           |
| Illinois             | 26.5%  | 24.3% – 28.9%           |
| Indiana              | 40.3%  | 36.6% – 44.1%           |
| Iowa                 | 33.2%  | 28.1% – 38.8%           |
| Kansas               | 42.8%  | 37.4% – 48.3%           |
| Kentucky             | 46.7%  | 42.6% – 50.8%           |
| Louisiana            | 32.8%  | 28.0% – 38.0%           |
| Maine                | 35.9%  | 29.7% – 42.6%           |
| Maryland             | 21.7%  | 18.5% – 25.2%           |
| Massachusetts        | 15.8%  | 13.4% – 18.6%           |
| Michigan             | 34.7%  | 32.0% – 37.5%           |
| Minnesota            | 32.5%  | 28.4% – 36.8%           |
| Mississippi          | 39.5%  | 33.5% – 45.8%           |
| Missouri             | 39.7%  | 36.2% – 43.4%           |
| Montana              | 48.4%  | 38.7% – 58.3%           |
| Nebraska             | 37.2%  | 29.8% – 45.2%           |
| Nevada               | 38.0%  | 32.8% – 43.4%           |
| New Hampshire        | 24.1%  | 18.4% – 30.9%           |
| New Jersey           | 19.3%  | 16.9% – 22.0%           |
| New Mexico           | 33.8%  | 25.9% – 42.7%           |
| New York             | 22.7%  | 21.3% – 24.2%           |
| North Carolina       | 37.3%  | 34.5% – 40.2%           |
| North Dakota         | 42.6%  | 29.9% – 56.4%           |
| Ohio                 | 33.7%  | 31.1% – 36.4%           |
| Oklahoma             | 40.5%  | 36.2% – 45.0%           |
| Oregon               | 38.3%  | 32.7% – 44.2%           |
| Pennsylvania         | 30.3%  | 28.1% – 32.6%           |
| Rhode Island         | 16.9%  | 11.4% – 24.2%           |
| South Carolina       | 40.7%  | 36.5% – 45.1%           |
| South Dakota         | 39.2%  | 32.4% – 46.4%           |
| Tennessee            | 43.0%  | 39.5% – 46.6%           |
| Texas                | 36.0%  | 34.1% – 38.0%           |
| Utah                 | 42.8%  | 36.1% – 49.8%           |
| Virginia             | 30.6%  | 27.6% – 33.7%           |
| Washington           | 32.8%  | 29.3% – 36.4%           |
| West Virginia        | 53.0%  | 45.6% – 60.2%           |
| Wisconsin            | 33.3%  | 29.9% – 36.9%           |
| Wyoming              | 42.7%  | 34.5% – 51.2%           |

Table 1: Proportion of the population estimated to own a firearm in each state.

- About half of defensive gun uses involve more than one assailant (51.2%).
- Handguns are the firearm most commonly used in defensive incidents (65.9%), followed

by shotguns (21.0%) and rifles (13.1%).

Defensive use of firearms was assessed through a series of questions that asked for increasingly detailed information from those who indicated that they had used a firearm in self-defense.

First, all gun owners were asked, “Have you ever defended yourself or your property with a firearm, even if it was not fired or displayed? Please do not include military service, police work, or work as a security guard.” About a third (31.1%) answered in the affirmative, and they were then asked how many times they defended themselves with a firearm (from “once” to “five or more times”). As Figure 2 shows, a majority of gun owners who have used a firearm to defend themselves have done so on more than one occasion.

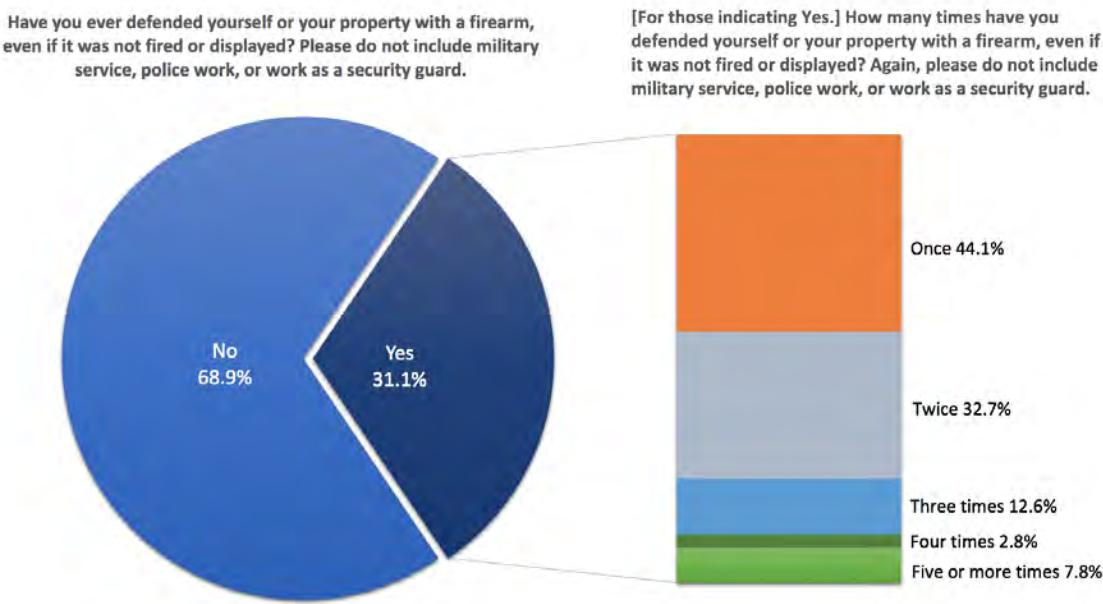


Figure 2: Defensive Gun Use: 31.1% of firearms owners have defended themselves of their property with a gun, and a majority have done so more than once.

Both men and women report having used firearms in self-defense at high rates, with 33.8% of male gun owners indicating they have defensively used a gun, and 27.3% of female gun owners indicating they have defensively used a gun. Table 2 further breaks down reports of

defensive use of firearms by categories of race and ethnic ancestry, illustrating that defensive gun use rates are higher in some minority groups.

| <b>Demographic Group</b> | <b>Proportion of Gun Owners</b> | <b>95% Confidence</b> |
|--------------------------|---------------------------------|-----------------------|
|                          | <b>Who Used Gun Defensively</b> | <b>Interval</b>       |
| White                    | 29.7%                           | 29.0% – 30.5%         |
| Black                    | 44.3%                           | 41.2% – 47.5%         |
| Asian                    | 26.0%                           | 21.7% – 30.9%         |
| Native American          | 47.7%                           | 42.7% – 52.7%         |
| Pacific Islander         | 37.1%                           | 26.0% – 49.7%         |
| Other Ethnic Ancestry    | 36.2%                           | 30.3% – 42.7%         |
| Hispanic (any ancestry)  | 39.3%                           | 36.0% – 42.8%         |
| Male                     | 33.8%                           | 32.8% – 34.8%         |
| Female                   | 27.3%                           | 26.2% – 28.4%         |

Table 2: Demographics of defensive gun use.

Given that 31.1% of firearms owners have used a firearm in self-defense, this implies that approximately 25.3 million adult Americans have defended themselves with a firearm. Answers to the frequency question suggest that these gun owners have been involved in a total of approximately 50 million defensive incidents. Assuming that defensive uses of firearms are distributed roughly equally across years, this suggests at least 1.67 million defensive uses of firearms per year in which firearms owners have defended themselves or their property through the discharge, display, or mention of a firearm (excluding military service, police work, or work as a security guard).<sup>9</sup>

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<sup>9</sup>This is calculated by taking the total number of defensive incidents represented by the survey responses (50 million) and dividing by the number of adult years of the average respondent, which is 30. According to U.S. Census data, the average age of U.S. adults (i.e. the average age of those in the set of everyone 18 years or older) is 48, which also matches our survey data. Thus, the average respondent of the survey has 30 years of adult experience (48 years - 18 years = 30 adult years), over which the defensive incidents captured in this survey are reported.

Note that this estimate is inherently conservative for two reasons. First, it assumes that gun owners possessed firearms, or had access to firearms, from the age of 18. In so far as firearms were only first ac-

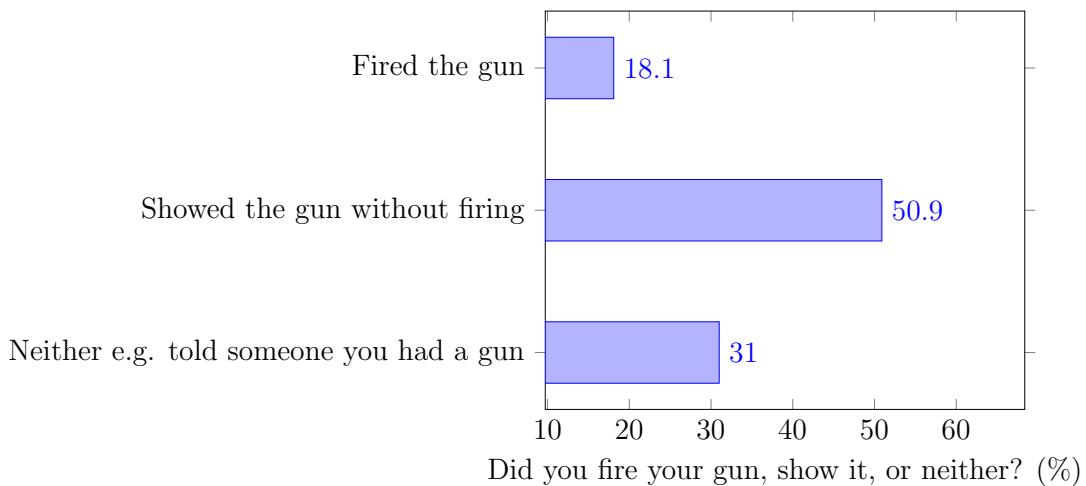


Figure 3: How Guns are Employed in Self-defense: In most defensive incidents no shots are fired.

Gun owner respondents were asked to answer detailed questions regarding each defensive

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quired/accessed by some respondents in later years, this would reduce the number of adult firearms owning years represented by the survey responses and result in a higher estimate of the number of defensive incidents per year. Second, this figure only captures defensive gun uses by those currently indicating firearms ownership. According to Kleck and Gertz (1995), only 59.5% of respondents who reported a defensive gun use personally owed a gun (p.187). This would suggest that the true number of defensive gun uses, if those who do not personally own firearms are included in the estimate, could be substantially higher - perhaps as high as 2.8 million per year.

This approach is also robust to critiques that have been made by Hemenway (1996) and others who argue that defensive gun use estimates from surveys can be exaggerated due to recollection bias when respondents are asked to recount incidents within a limited time period. The intuition behind these critiques is that if respondents are asked, for example, if they used a gun defensively within the last year, there is a possibility that people will respond affirmatively if they used a gun in self-defense in recent memory, even if that incident wasn't strictly within the last 12 months. This could lead to inflated "per year" estimates of defensive gun uses, which would only be further magnified when extrapolated out to total defensive gun uses over many years. However, the approach of this survey is not vulnerable to this critique because the survey asks about defensive gun use at any time, not simply those within the last year or some other short time horizon. We thus do not engage in the exercise of extrapolating out estimates from potentially biased measures of comparatively rare events in a restricted window of time. Rather our approach asks questions about defensive gun use in the manner that is most methodologically sound for eliciting unbiased estimates.

Finally, note that our overall approach assumes that children are not employing firearms for self-defense

incident that they reported. As Figure 3 shows, in the vast majority of defensive gun uses (81.9%), the gun was not fired. Rather, displaying a firearm or threatening to use a firearm (through, for example, a verbal threat) was sufficient. This suggests that firearms have a powerful deterrent effect on crime, which, in most cases, does not depend on a gun actually being fired or an aggressor being injured.

Figure 4 shows where defensive gun uses occurred. Approximately a quarter (25.2%) of defensive incidents took place within the gun owner's home, and approximately half (53.9%) occurred outside their home but on their property. About one out of ten (9.1%) of defensive gun uses occurred in public, and about one out of thirty (3.2%) occurred at work.

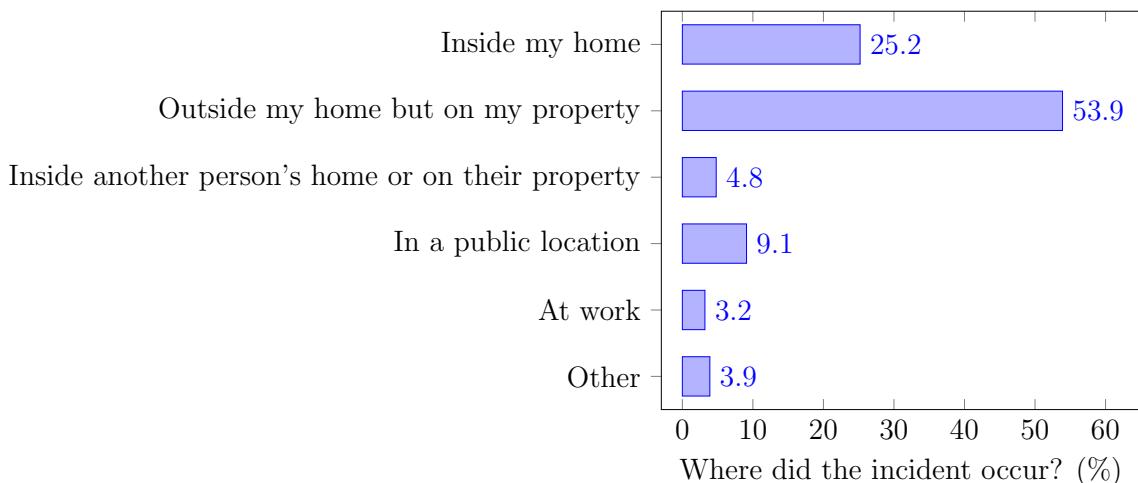


Figure 4: The Location of Defensive Incidents: Most take place outside the home.

For each incident, respondents were asked to indicate what sort of firearm was used. Figure 5 show the distribution of types of firearms employed in defensive incidents. Handguns were the most commonly used firearm for self-defense, used in nearly two-thirds (65.9%) of defensive incidents, followed by shotguns (21.0%) and rifles (13.1%).

Respondents were also asked to indicate how many assailants were involved in each de-  
with any meaningful frequency. However, for the purpose of sensitivity analysis, if we lower the age used  
for calculating defensive incident frequency to assume that children as young as 12 years old are commonly  
possessing and using firearms for self-defense (and no non-firearms owning adults used firearms for self-  
defense), this would still imply 1.39 million defensive uses of firearms per year (48 years - 12 years = 36 years  
over which 50 million defensive incidents took place).

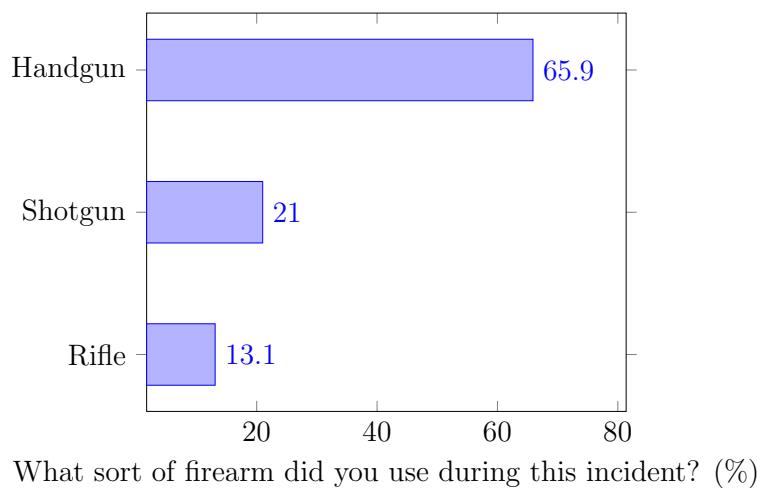


Figure 5: Type of Gun Used for Defense: Handguns are the most common type of firearm used in defensive encounters, followed by shotguns and rifles.

fensive incident. As Figure 6 illustrates, about half of defensive encounters (51.2%) involved more than one assailant. Presumably, part of the value of using a firearm in self-defense is that it serves as a force multiplier against more powerful or more numerous assailants. Survey responses confirm that encountering multiple assailants is not an infrequent occurrence in defensive incidents. 30.8% of defensive incidents involved two assailants, and 20.4% involved three or more, while slightly less than half (48.8%) involved a single assailant.

Finally, after respondents answered these detailed questions about each defensive incident, which all flowed from their initial affirmative answer to the question, “Have you ever defended yourself or your property with a firearm, even if it was not fired or displayed?”, all gun owners were asked, “Separate from any incident in which you directly used a gun to defend yourself, has the presence of a gun ever deterred any criminal conduct against you, your family, or your property?” This question was meant to capture incidents that did not involve active self-defense, but for which individuals believed that the presence of a firearm helped deter predatory behavior. For example, a situation in which a combative customer calmed down after noticing that shop owner had a handgun on his or her hip, or a situation in which a trespasser cooperatively left a property when questioned by a landowner who had a rifle slung over his or her shoulder, or a situation in which a friend showed up with a firearm

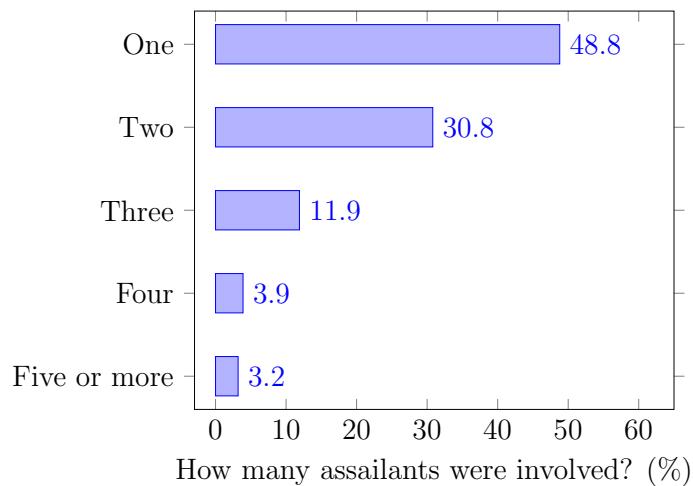


Figure 6: Distribution of the Number of Assailants Involved in a Defensive Incident: Multiple assailants are common.

to help diffuse a dangerous situation, could fall into this category. Respondents answering in the affirmative could indicate how many times such deterrence occurred, from once to five or more occasions. As Figure 7 illustrates, separate from the self-defense incidents summarized earlier, 31.8% of gun owners reported that the mere presence of a gun has deterred criminal conduct, and 40.2% of these individuals indicated that this has happened on more than one occasion. Extrapolated to the population at large, this suggests that approximately 25.9 million gun owners have been involved in an incident in which the presence of a firearm deterred crime on some 44.9 million occasions. This translates to a rate of approximately 1.5 million incidents per year for which the presence of a firearm deterred crime.

## 4 Carry Outside of the Home

- A majority of gun owners (56.2%) indicate that there are some circumstances for which they carry a handgun for self-defense.
- Approximately 26.3% of gun owners, or 20.7 million individuals, carry handguns for defensive purposes under a “concealed carry” regime.
- About a third of gun owners (34.9%) have wanted to carry a handgun for self-defense

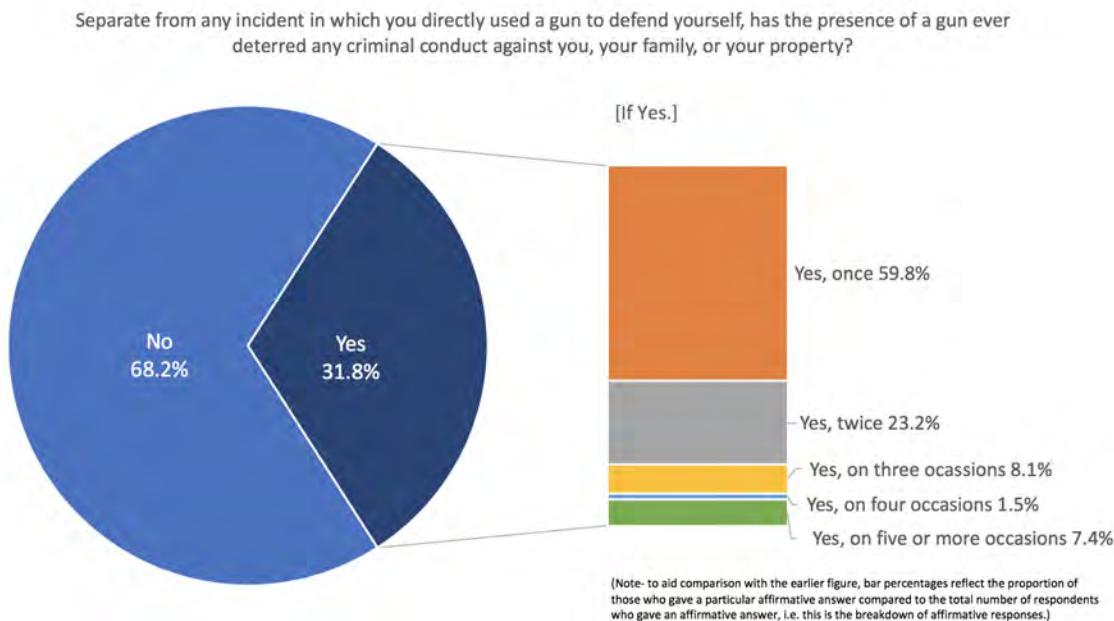


Figure 7: Frequency with which Firearms Deter Crime: 31.8% of firearms owners report that the presence of a firearm has deterred criminal conduct against them, often on more than one occasion.

in a particular situation but local rules prohibited them from doing so.

As Figure 8 illustrates, a majority of gun owners (56.2%), or about 45.8 million, indicate that there are some circumstances in which they carry a handgun for self-defense (which can include situations in which no permit is required to carry, such as on their own property); and about 35% of gun owners report carrying a handgun with some frequency (indicating that they carry “Sometimes,” “Often,” or “Always or almost always.”). Moreover, as Figure 9 summarizes, 34.9% of gun owners report that there have been instances in which they wanted to carry a handgun for self-defense, but local rules did not allow them to carry.

Assessing the number of people who carry a concealed handgun in public is complicated due, in part, to the proliferation of so-called “constitutional carry” or “permitless carry” states in recent years. These states - about 18 at the time this survey was conducted - generally allow adults in good legal standing (often restricted to those age 21 and older) to

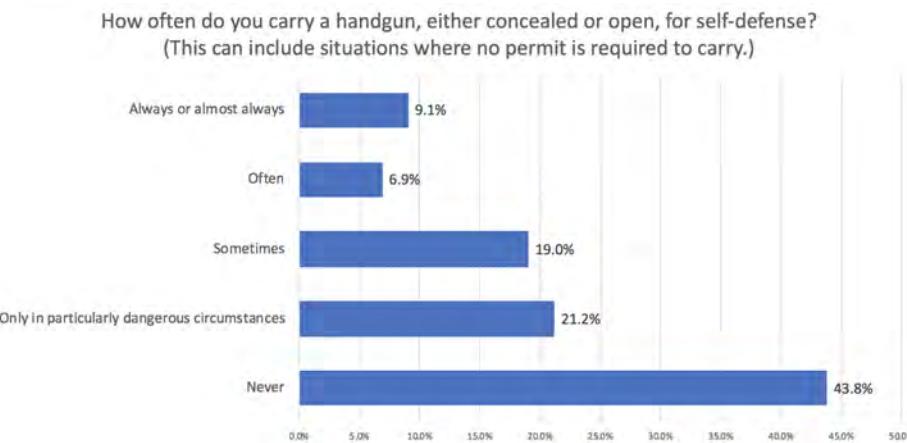


Figure 8: Frequency of Defensive Carry: Carrying a handgun for self-defense is common.

Have you ever wanted to carry a handgun for self-defense  
 but local rules did not allow you to carry?

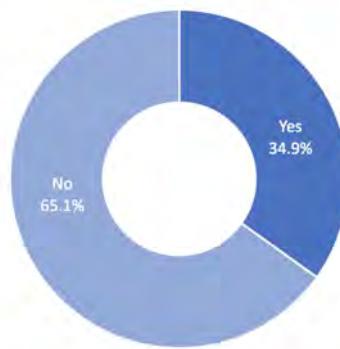


Figure 9: Prohibition of Carry: About a third of gun owners have wanted to carry a handgun for self-defense in a particular situation but local rules prohibited them from doing so.

carry a concealed weapon without a permit. Most of these states previously had a permitting process for concealed carry and required permits to be renewed at regular intervals in order to remain valid. Under constitutional carry, law abiding adults in these states are permitted to carry concealed without an official “permit.” However, most of these states continue to issue permits to residents who desire them because such permits can be useful for reciprocal carry benefits in other states. For example, a person acquiring a Utah carry permit would be entitled to carry a handgun in a number of other states such as neighboring Colorado and

Nevada.<sup>10</sup> Thus, while basically all gun owners age 21 and over are “permitted” to carry a handgun for self-defense in constitutional carry states, many individuals may also possess a “permit,” even though it is redundant for in-state carry.

Unsurprisingly, when asked “Do you have a concealed carry permit?” gun owning residents of many constitutional carry states respond in the affirmative at high rates. Also complicating this question about concealed carry permits is the fact that many states refer to such permits by different names, the fact that the right to carry a handgun can be conferred in certain circumstances by hunting or fishing licenses in some states,<sup>11</sup> and the existence of other related permits, some of which do not license concealed carry (e.g. standard pistol permits in North Carolina or New York, eligibility certificates in Connecticut) and some of which do (most License To Carry permits required for handgun ownership in Massachusetts, state pistol permits in Connecticut, and LEOSA permits available to current and retired law enforcement officers nationwide). Finally, it is also possible for individuals to obtain concealed carry permits in states other than the one in which they reside.

In order to provide a robust but conservative estimate of those who actually carry in public, we code as “public carriers” those individuals who indicated both that they have a concealed carry permit and that they carry a handgun for self-defense at least “sometimes.” We also restrict analysis and population estimates to those age 21 and over given that most states restrict those under 21 from carrying concealed in public.

Using this simple definition, we find that 26.3% of gun owners are “public carriers,” which translates to approximately 20.7 million individuals who carry handguns in public under a concealed carry regime. Note that this could include current and former law enforcement officers who may be represented in the survey. However, the number of active law enforcement officers in the U.S. is well under a million (approximately 700,000 in 2019).<sup>12</sup>

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<sup>10</sup>See <https://bci.utah.gov/concealed-firearm/reciprocity-with-other-states/>

<sup>11</sup>For example, a number of states such as California, Georgia, and Oregon allow those with a hunting or fishing license to carry concealed while engaged in hunting or fishing or while going to or returning from an expedition. See: <https://oag.ca.gov/sites/all/files/agweb/pdfs/firearms/pdf/cf12016.pdf>, <https://law.justia.com/codes/georgia/2010/title-16/chapter-11/article-4/part-3/16-11-126/>,

<sup>12</sup>See <https://ucr.fbi.gov/crime-in-the-u-s/2019/crime-in-the-u-s-2019/tables/table-74>

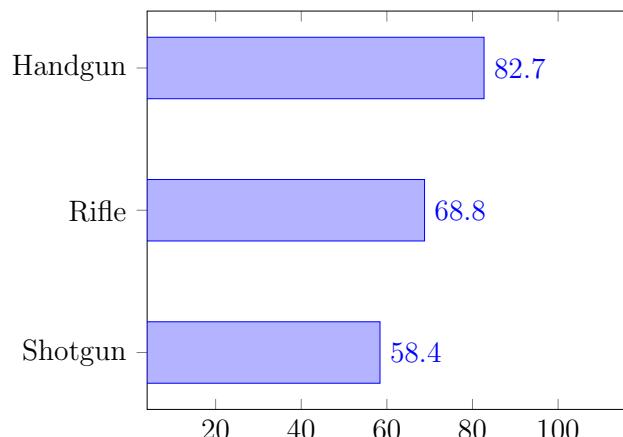
## 5 Types of Firearms and Magazines Owned

- 82.7% of gun owners report owning a handgun, 68.8% report owning a rifle, and 58.4% report owning a shotgun.
- The average gun owner owns about 5 firearms. The median gun owner owns 3.
- 29.0% of gun owners own only one firearm.
- 30.2% of gun owners, about 24.6 million people, have owned an AR-15 or similarly styled rifle, and up to 44 million such rifles have been owned.
- 48.0% of gun owners, about 39 million people, have owned magazines that hold over 10 rounds, and up to 542 million such magazines have been owned.
- Overall, Americans own in excess of 415 million firearms, consisting of approximately 171 million handguns, 146 million rifles, and 98 million shotguns.

### 5.1 Rifles, Shotguns, and Handguns

Respondents were asked to indicate the number of rifles, shotguns, and handguns that they owned. 82.7% of gun owners report owning a handgun (95% CI 82.0% - 83.3%), 68.8% reported owning a rifle (95% CI 68.1% - 69.6%), and 58.4% report owning a shotgun (95% CI 57.6% - 59.2%). Note that using survey weights based on in-survey demographics of firearms ownership has no substantive effect on these estimates: Handgun, 83.7% (82.9% - 84.4%), Rifle, 68.6% (67.7% - 69.6%), Shotgun 58.6% (57.6% - 59.6%).

Approximately 99.8% of respondents indicated owning fewer than 100 firearms of each type, and approximately 97.2% indicated owning fewer than 10 firearms of each type. In order to provide a conservative estimate of ownership rates and to ensure that average estimates are not skewed by a small number of large outliers, we exclude the 0.2% of responses that indicated owning over 100 firearms in any category in the analysis that examines average numbers of guns owned. Also, 1.5% of respondents entered zero for each category of firearms ownership. While ostensibly inconsistent with having earlier indicated ownership of a firearm, there are a number of plausible explanations for this discrepancy including a reluctance to



Percentage of gun owners reporting ownership of at least one firearm in the indicated category.

Figure 10: Percent of gun owners who own each type of firearm.

provide this level of detailed information, having use of a firearm in one's household which one does not personally own, or owning a firearm that technically does not fall into one of these three categories. We exclude these response in analyzing ownership rates below. However, including them has no significant effect on estimates.

On average, gun owners owned 5.1 firearms, consisting of 1.8 rifles, 1.2 shotguns, and 2.1 handguns. Figure 11 plots histograms of the number of firearms owned by respondents. Unsurprisingly, these are skewed right, indicating that most gun owners own a small number of guns, while a smaller portion of gun owners own a large number of guns. The median gun owner owned 3 firearms. 29.0% of firearms owners owned only one firearm.<sup>13</sup> Among those who only own one firearm, handguns are the most commonly owned type of gun (64.7%), followed by rifles (22.5%) and shotguns (13.3%).

Overall, these estimates imply that Americans own over 415 million firearms, consisting of approximately 171 million handguns, 146 million rifles, and 98 million shotguns.

<sup>13</sup>An earlier draft had estimated that 21.9% of gun owners owned only one firearm, but the denominator for that calculation mistakenly included respondents who did not provide an answer to this question. The estimate of 29.0% properly incorporates all information provided by respondents.

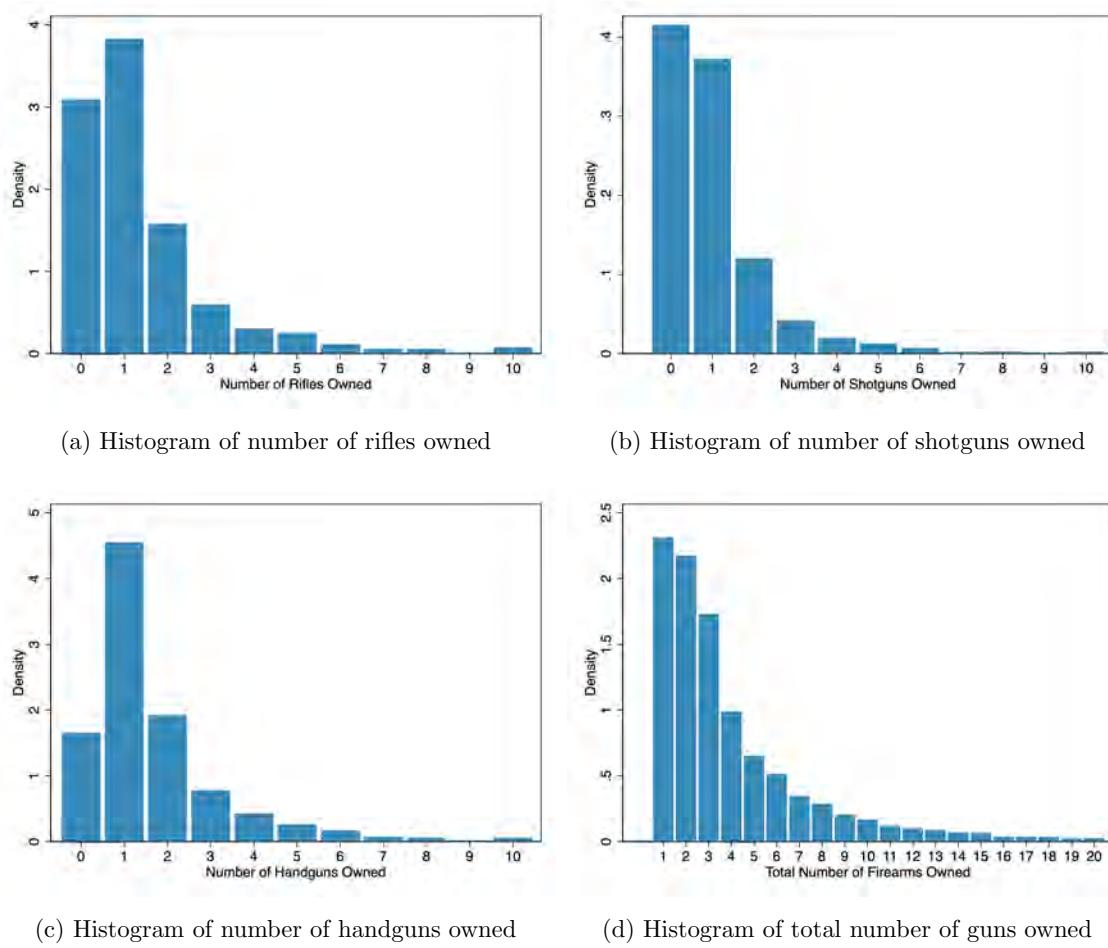


Figure 11: Histograms showing the distributions of gun ownership.

## 5.2 Magazine Ownership

The survey asked respondents whether they have ever owned a magazine that holds more than 10 rounds. Those who answered in the affirmative were then asked to indicate the purposes for which they owned such magazines and to estimate how many magazines of different types they owned.

48.0% of gun owners (95% CI 47.2%-48.7%) responded yes to the question, “Have you ever owned a handgun or rifle magazine that holds more than 10 rounds? (You can count magazines that you may keep in another state if there are local restrictions against ownership.)” indicating that they had owned such magazines. Note that, again, using survey

weights based on in-survey demographics of firearms ownership has no substantive effect on this estimate (47.4%, CI 46.5%-48.4%). This suggests that approximately 39 million adults in the U.S. have owned magazines that hold more than 10 rounds.

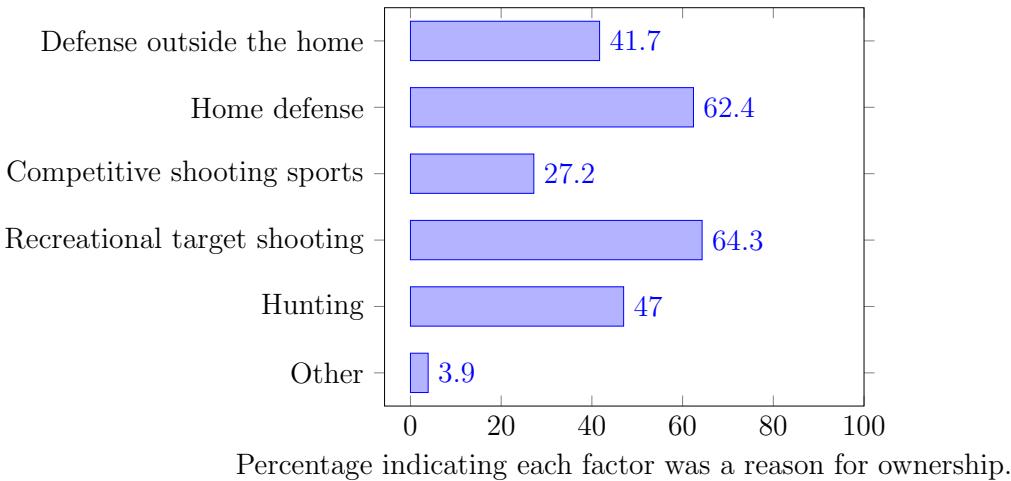


Figure 12: Purposes indicated for owning 11+ capacity magazines.

Figure 12 shows the percentage of respondents who indicated that they owned magazines that can hold more than 10 rounds for the following purposes: defense outside the home (41.7%), home defense (62.4%), competitive shooting sports (27.2%), recreational target shooting (64.3%), hunting (47.0%), and other (3.9%). Note that respondents could choose multiple purposes for which they owned such magazines. Home defense and recreational target shooting were the two most common reasons indicated for owning these magazines, with approximately two-thirds of respondents identifying each of these as a rationale for ownership.

Respondents who indicated that they had owned magazines that can hold more than 10 rounds were also asked to estimate the number of pistol and rifle magazines they owned of particular sizes. Numerical responses were unbounded. Approximately 99.8% of respondents indicated owning fewer than 100 magazines of each type, and approximately 96.5% indicated owning fewer than 10 magazines of each type. In order to provide a conservative estimate of ownership rates and to ensure that average estimates are not skewed by a small number of large outliers, we exclude the 0.2% of responses that indicated owning over 100 magazines

in a category.

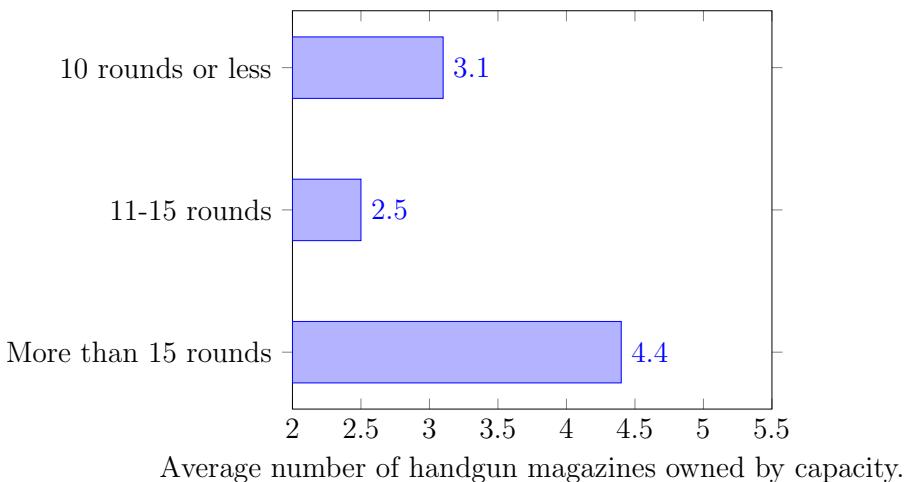


Figure 13: About how many handgun magazines of each type would you estimate you have owned?

Figure 13 shows the average number of handgun magazines of each type reported by respondents in this section: 10 rounds or less (3.1 magazines), 11-15 rounds (2.5 magazines), more than 15 rounds (4.4 magazines). In sum, the average respondent (who indicated that they have owned a magazine that holds more than 10 rounds), owns about 10 handgun magazines, and more than two-thirds of these magazines hold more than 10 rounds. Note that the question asked whether respondents have ever owned such magazines and how many such magazines they have owned, so these estimates should be interpreted as an upper bound on current ownership given that some magazines may have been resold. Building on earlier estimates, this suggests that U.S. gun owners have owned up to 269 million handgun magazines that hold over 10 rounds.

Figure 14 shows the average number of rifle magazines of each type reported by respondents in this section: 10 rounds or less (2.4 magazines), 11-15 rounds (1.8 magazines), over 15 rounds (5.4 magazines). In sum, the average respondent (who indicated that they have owned a magazine that holds more than 10 rounds), owns about 9.6 rifle magazines, and about three-quarters of these magazines hold more than 10 rounds. Building on earlier estimates, this suggests that U.S. gun owners have owned up to 273 million rifle magazines that

hold over 10 rounds.

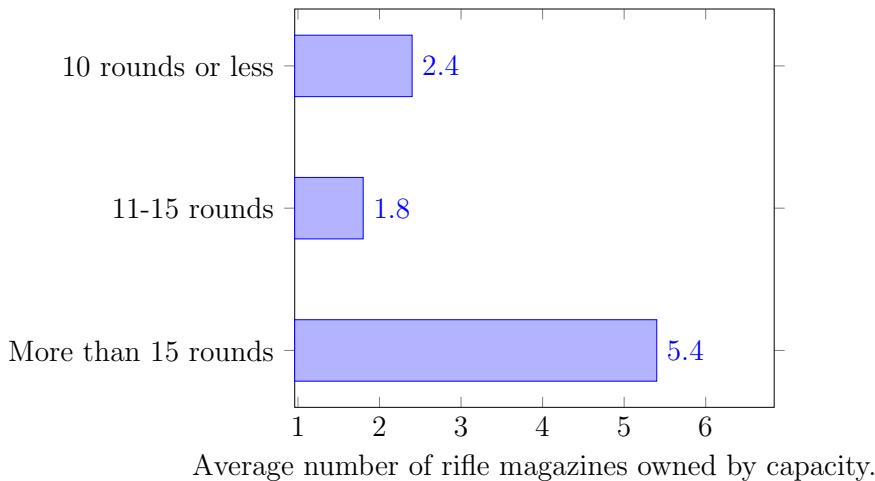


Figure 14: About how many rifle magazines of each type would you estimate you have owned?

These estimates suggest that Americans have owned some 542 million rifle and handgun magazines that hold over 10 rounds. Finally, note that these questions about the types of magazines owned were only asked of those who indicated that they had owned a magazine that holds more than 10 rounds, and thus we do not know how many magazines up to 10 rounds are owned by the 52.0% of gun owners who are not in this category.

Table 3 shows the breakdown of ownership of magazines that hold over 10 rounds across different demographic segments.

Table 4 shows the percentage of gun owners in each state who indicated that they have owned magazines that hold more than 10 rounds. Note that this question explicitly instructed respondents that “You can count magazines that you may keep in another state if there are local restrictions against ownership.” This presumably explains the relatively high rates of ownership in states that restrict the purchase or ownership of such magazines. It’s also possible that those answering in the affirmative possess magazines that were grandfathered in because they were acquired before such bans or that some respondents have gotten rid of magazines that they owned in the past.

Another dynamic that likely contributes to such differences in ownership rates derives

| Demographic Group       | Proportion<br>Owned 11+ Mags | 95% Confidence<br>Interval |
|-------------------------|------------------------------|----------------------------|
| White                   | 47.0%                        | 46.1% – 47.8%              |
| Black                   | 55.2%                        | 52.2% – 58.2%              |
| Asian                   | 50.0%                        | 44.8 – 55.2%               |
| Native American         | 52.6%                        | 47.7% – 57.4%              |
| Pacific Islander        | 59.1%                        | 47.4% – 69.9%              |
| Other Ethnic Ancestry   | 59.6%                        | 53.3% – 65.6%              |
| Hispanic (any ancestry) | 61.6%                        | 58.3% – 64.7%              |
| Male                    | 57.7%                        | 56.7% – 58.7%              |
| Female                  | 34.1%                        | 33.0% – 35.3%              |

Table 3: Demographics of ownership of magazines that hold more than 10 rounds.

from the fact that in states with low rates of firearms ownership, such as DC and Hawaii, those few individuals who do own guns are presumably more likely to be gun enthusiasts. Indeed, analysis of the survey data reveals that states with higher rates of firearms ownership are associated with slightly lower rates of ownership of magazines that own over 10 rounds, and this difference is statistically significant (coef = -0.36, p=.03).

Given that such a large percentage of gun owners indicated that they owned magazines that hold over ten rounds for defensive purposes, we further analyze the potential value of these magazines for defense. Recall that a majority of defensive incidents involved multiple assailants (51.2%). Presumably, it would be advantageous to have a firearm with a larger capacity magazine if one needed to engage more than one assailant, which these responses suggest is indeed common. Although in most defensive gun uses the gun was not fired (81.9%), we can further analyze the subset of incidents in which a gun was fired. In 67.8% of these cases in which a gun was fired in self defense, multiple rounds were fired.

As part of the self-defense section of the survey, respondents were invited to answer an open response question that asked: “Have you ever been in a situation (including any referenced in earlier responses) in which it would have been useful for defensive purposes

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| State                | Owned 11+ cap. mags | 95% Confidence Interval |
|----------------------|---------------------|-------------------------|
| Alabama              | 48.1%               | 42.7% – 53.6%           |
| Alaska               | 52.7%               | 39.6% – 65.4%           |
| Arizona              | 47.5%               | 42.3% – 52.8%           |
| Arkansas             | 50.7%               | 44.1% – 57.3%           |
| California           | 53.8%               | 51.0% – 56.5%           |
| Colorado             | 51.4%               | 45.3% – 57.4%           |
| Connecticut          | 42.6%               | 34.4% – 51.3%           |
| Delaware             | 50.6%               | 39.8% – 61.5%           |
| District of Columbia | 69.2%               | 49.5% – 83.8%           |
| Florida              | 46.9%               | 43.9% – 49.8%           |
| Georgia              | 52.4%               | 48.7% – 56.2%           |
| Hawaii               | 59.3%               | 40.3% – 75.8%           |
| Idaho                | 45.4%               | 36.7% – 54.4%           |
| Illinois             | 51.5%               | 47.3% – 55.6%           |
| Indiana              | 46.5%               | 41.8% – 51.2%           |
| Iowa                 | 35.4%               | 28.0% – 43.6%           |
| Kansas               | 42.2%               | 35.4% – 49.4%           |
| Kentucky             | 43.7%               | 38.5% – 49.0%           |
| Louisiana            | 47.4%               | 41.1% – 53.8%           |
| Maine                | 37.9%               | 28.7% – 48.0%           |
| Maryland             | 50.8%               | 43.7% – 57.8%           |
| Massachusetts        | 53.3%               | 45.7% – 60.8%           |
| Michigan             | 37.1%               | 33.2% – 41.1%           |
| Minnesota            | 39.8%               | 34.0% – 46.0%           |
| Mississippi          | 44.6%               | 37.3% – 52.2%           |
| Missouri             | 50.6%               | 45.8% – 55.5%           |
| Montana              | 52.6%               | 39.8% – 65.1%           |
| Nebraska             | 45.5%               | 35.9% – 55.3%           |
| Nevada               | 61.0%               | 52.8% – 68.5%           |
| New Hampshire        | 43.9%               | 31.6% – 56.9%           |
| New Jersey           | 52.2%               | 46.5% – 57.8%           |
| New Mexico           | 49.2%               | 36.9% – 61.5%           |
| New York             | 54.9%               | 51.8% – 58.0%           |
| North Carolina       | 43.9%               | 39.9% – 47.9%           |
| North Dakota         | 44.4%               | 24.0% – 67.0%           |
| Ohio                 | 42.0%               | 38.4% – 45.7%           |
| Oklahoma             | 47.5%               | 41.7% – 53.4%           |
| Oregon               | 49.8%               | 42.9% – 56.6%           |
| Pennsylvania         | 39.6%               | 36.0% – 43.2%           |
| Rhode Island         | 55.3%               | 39.5% – 70.1%           |
| South Carolina       | 42.8%               | 37.7% – 48.0%           |
| South Dakota         | 50.0%               | 40.2% – 59.8%           |
| Tennessee            | 44.1%               | 39.5% – 48.7%           |
| Texas                | 54.1%               | 51.3% – 56.8%           |
| Utah                 | 46.8%               | 38.2% – 55.6%           |
| Virginia             | 47.5%               | 42.7% – 52.4%           |
| Washington           | 53.1%               | 47.8% – 58.4%           |
| West Virginia        | 44.8%               | 37.7% – 52.1%           |
| Wisconsin            | 33.6%               | 28.5% – 39.0%           |
| Wyoming              | 63.0%               | 51.4% – 73.3%           |

Table 4: Percent of gun owners who have indicated that they have ever owned magazines that hold over 10 rounds by state. Note that this includes magazines that an owner holds in other states if there are local ownership restrictions.

to have a firearm with a magazine capacity in excess of 10 rounds? If so, please briefly describe that situation.” Approximately 550 respondents gave a affirmative response with most sketching out details of the encounter. Examples of these responses (reported verbatim) include:

- I got jumped by multiple people in a carjacking in front of our apartments with my wife and children.
- Yes. I was robbed on a street 1 time by a group of about 6 people that at least 1 was armed and I wasn’t. It took about 6 hours of emergency surgery to get my bones in face jaws and skull back in place from being beaten in the head face kicked all over. Damn near killed me.
- Yes, a man broke into our apartment, high. He was approx 6’4, 300 pounds & threw a friend of ours around the living room like a rag doll. Beat her repeatedly.
- Yes. The first incident I mentioned. Three men attempted to rob me outside my home, with the intention of entering my home thereafter. My wife and child were inside the home at the time. That was in California with a magazine that only held 7 shots. I am a great shot, prior military and other firearms training, but I hate to only have 7 shots with three people. In such a situation, very well trained people, pumped up with adrenalin can and do miss their target. Thank you.
- Yes, absolutely. I am mobility challenged and was walking my dog one day. Three men ambushed me from behind, but luckily my dog chased them away. My dog actually bit one of the men.
- On the farm, we have had mountain lions killing our calves so a larger animal could require more rounds
- When two people attacked my company’s warehouse
- Yes, I was alone with my son and 3 large men were trying to break in, I was unable to reload, thank goodness they realized and left.

- I was charged by a bear. It was very scary in the moment I panicked and rattled over multiple shots. Most missed but some hit home and eventually stopped him.
- Yes. I went in but into a store and 4 thugs approached me telling me to give them money. I produced my handgun at my side and they left. If this had been a shooting with multiple bad guys with guns a 15 round magazine is best.
- When I was a teenager 4 guys did a home invasion at our house. I could easily see needing a 20 to 30 round clip would be necessary.. we didnt have weapons and my mom and dad were hurt pretty bad. Dad was stabbed 4 times and they had a gun too. Thats when I decided when I was on my own that I would have protection.
- About 20 coyotes attacked some of my livestock. It took two 30 round magazines to repel the animals and then only after killing 10 of them.
- Yes. I was surrounded by would-be assailants in a parking lot. I was able to escape unharmed, but if they had rushed me, I would most certainly had to lay down a rapid field of fire, alternately in various directions. In that scenario, I probably would have missed the targets and needed multiple, rapid follow-up shots to hit or at least dissuade the attackers from pressing forward. Only a firearm with 10 or more round magazine would offer that kind of defensive capability.
- Had several people trespass on my property doing something illegal and when I called the police said it would be a while before they could come out so when I asked the people to leave they threatened to kill me but after they seen that I was open carry the left if the situation went a different way I dont know if I would have been about to protect myself with as many of them as there was
- The time when there were 4 people in my home and I was fearful of being hurt and my concern was do I have enough rounds to protect myself what if I missed if I had to fire the weapon .
- Yes. Been stalked by a pack of coyotes while hiking with my children

- Yes when I had more than one person trying to break into my car. I live out in the country so I do not have time to wait for police to get to me I have to act fast and protect myself and my family.
- Yes, I ran into a situation where there were numerous criminals breaking the law and rioting at a public venue during an annual festival event. They were blocking my self and my friends, two of which were females, from leaving the area as well as preventing the police from reaching us. I was very glad that I had multiple magazines that had more then a 10 round capacity.
- 2 men broke into my home while I was sleeping. I woke up and heard them breaking stuff downstairs. I grabbed my gun and ran down stairs and confronted them. I pointed my gun at them and told them to get out. They ran off.
- I was stopped at a red light. Car in front of me backed up and the car behind me pulled up to my bumper. Both drivers got out and approached both sides of my car. Light turned green. I gassed it pushing the car in front of me out of the way. They had bats to break my windows. Would've robbed me I think. Was under a overpass.
- Twice it was people attempting to break into my home I was alone age 64 and 4 burly men thought no one was home as I had been napping. They learned quickly this old lady was not without protection. They saw the gun and quickly left. I called 911 and they were apprended they had been robbing homes for 6 weeks in the area. Those home who had guns they left and went elsewhere. Another time people a group wanted a big party came to the wrong road half were drunk or stoned. I had small children. There was finally someone sober enough to see I had a gun and that I meant business it was the middle of the night and they wanted to party but had the wrong road. The sane person got them to all leave and they never came back. We had no phone at that time. The third time was a cougar attacking my livestock. It ran off but had killed 4 goats. We called the game warden they had a special hunt and killed it as we had been the 4th place hit it had killed livestock. We have had cougar on our property in our yard 3 times since once my son shot one stalking him and his dog the other time

it ran off before he could get his gun ready.

- yes, but not at home, we were camping in prescott arizona and several men came up and wanted to harass and steal from our family. We all felt very threatened and if another couple of people had not shown up with their guns the people would have over ran us and my family would have been hurt.
- It could have helped during a robbery at my residence where 4 intruders entered my home
- I was a small business owner before I became disabled. I would often carry large amounts of cash. On more than 1 occasion I was faced with pulling my weapon or lose my cash
- I was walking a long distance through Philadelphia to get to a restaurant and was approached by 3 men who demanded to know why I thought I could go through their neighborhood. I told them I did not want any trouble and tried to continue walking but one stood in my way and asked if I actually thought I was going to leave without answering them. I began to wonder if I was going to be robbed or assaulted when they first approached and at this point it seemed like they would prevent me from leaving. I lifted my shirt and placed my hand on a pistol I was legally able to conceal carry and said yes I would be leaving. They backed away from me but continued to yell things at me as I left the area. I never pulled the gun out, but them knowing I had it and may use it to stop them was enough to escape unharmed. Having less than 10 rounds against 3 attackers, especially if they were also armed, would have put me at a disadvantage if I was unable to accurately hit my targets initially and they continued to Pursue me.
- Yes, I was in Illinois, which does not honor Indiana concealed carry. I had to leave my firearm at home. This was truly the only time in my life I felt I needed to actually use a firearm, but almost was killed. 4 men (3 with guns displayed and 1 with a knife in his hand) were walking up to me fast in a parking lot screaming stop and give me everything you have. The parking lot was near empty, and dark outside. I was able

to unlock my car while running, start the car and speed off. Just as I got in the car, I had just enough time to lock the door before the 3 men pointed there guns at the car and the other was stabbing the window with a knife. They intended to rob and kill me. I couple rounds were fired as I sped off. I would have needed minimally 10 rounds if I had discharged given their distancing. I almost died because of Illinois law and my street smarts and luck was the only thing that saved me

- Yes An incident occurred when a man was drunk and crashed his car in front of me while I was carrying my 2 small children. A large group of his friends tried to get the drunk away before the police arrived. A fight started with them punching my elderly dad and threatened my elderly mother with violence.
- I was confronted then attacked by a group of about 12 teens when I was a teenager. They kicked me and caused a sever head injury and fractured ribs. I was defenseless. Being able to brandish a weapon with the capacity to take on a group of that size would have deterred their next step of physically assaulting me
- The two large males that attempted to break into my home. Much larger than myself. A 9mm would take several shots to slow down either and/or both.
- Yes. I am a 5'2" disabled female. I was stalked by a homeless drug addict. He was detained 4-5 times due to red behavior because he was high on methamphetamine. This person could have potentially done great harm to me. Meth addicts don't always go down easy. Sometimes it takes numerous rounds to get them down.
- My brother and I were robbed at gun point when one of the men got in the car with me after my brother got out of the car. The man had already told my brother that he wanted his money and that there were other people watching across the parking lot in case he had any problems with us. So when my brother got out, that man got in with a gun and stuck it right into my right side. He told me not to look at him and to give him all my money. With the other men standing in different positions in the parking lot my brother could have tried to shoot them (or at them) to try and scare them off

and if he could have had a larger capacity magazine he could have been able to fire more rounds at them to keep them away while we tried to get help from someone.

Finally, it is worth noting that, although a majority of these scenarios involve the prospect of defending against criminal aggression, a number involve defending against animals. The pilot survey in Vermont similarly documented a number of incidents involving animals (see Appendix A). This is a phenomenon that has been largely neglected in the scholarly literature examining the value of firearms for self-defense, and it would be helpful for future research to evaluate the frequency with which firearms are employed in defense against animal threats.

### 5.3 Ownership of AR-15 and similarly styled rifles

All gun owners were asked, “Have you ever owned an AR-15 or similarly styled rifle? You can include any rifles of this style that have been modified or moved to be compliant with local law.” 30.2% of gun owners, about 24.6 million people, indicated that they have owned an AR-15 or similarly styled rifle. Using survey weights based on in-survey demographics of firearms ownership has no effect on this estimate. Respondents were then asked to indicate how many of such rifles they have owned. Approximately 99.7% indicated owning under 100 and 98.4% under 10. In order to provide a conservative estimate of ownership rates and to ensure that average estimates are not skewed by a small number of large outliers, we disregard the 0.3% that indicate owning over 100 in calculating average ownership numbers. Among those who indicate having owned AR-15 and similarly styled rifles, they indicate having owned an average of 1.8, with the median owner having owned 1. This suggest that up to 44 million AR-15 styled rifles have been owned by U.S. gun owners. Note, again, that this estimate is based on a question that asks whether someone has ever owned such a rifle, so this estimate should be interpreted as an upper bound on current ownership given that some rifles may have been resold.

Figure 15 shows the percentage of respondents who indicated that they owned AR-15 styled rifles for the following purposes: defense outside the home (34.6%), home defense (61.9%), competitive shooting sports (32.1%), recreational target shooting (66.0%), hunting (50.5%), and other (5.1%). Note that respondents could choose multiple purposes for which

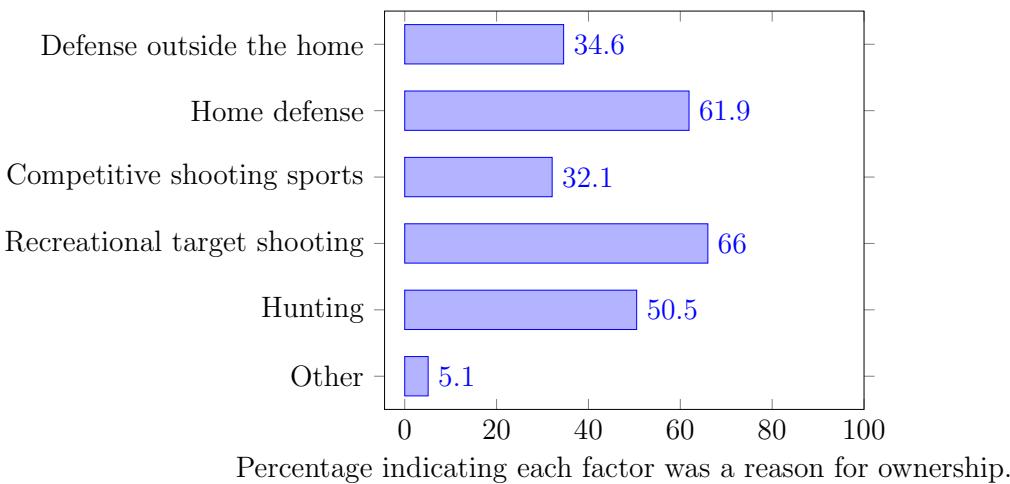


Figure 15: Purposes indicated for owning AR-15 styled rifles.

they owned such firearms. Home defense and recreational target shooting were the two most common reasons indicated for owning these magazines, with approximately two-thirds of respondents identifying each of these as a rationale for ownership.

| Demographic Group       | Proportion Owned<br>AR-15 Styled Rifle | 95% Confidence Interval |
|-------------------------|--|-------------------------|
| White                   | 29.6%                                  | 28.9% – 30.4%           |
| Black                   | 34.0%                                  | 31.0% – 37.1%           |
| Asian                   | 29.2%                                  | 24.6% – 34.2%           |
| Native American         | 35.4%                                  | 30.8% – 40.3%           |
| Pacific Islander        | 48.4%                                  | 36.3% – 60.7%           |
| Other Ethnic Ancestry   | 34.6%                                  | 28.8% – 41.1%           |
| Hispanic (any ancestry) | 38.3%                                  | 35.0% – 41.8%           |
| Male                    | 36.4%                                  | 35.5% – 37.4%           |
| Female                  | 21.3%                                  | 20.3% – 22.3%           |

Table 5: Demographics of ownership of AR-15 styled rifles.

Table 5 shows the breakdown of ownership of AR-15 styled rifles across different demographic segments. As this table demonstrates, AR-15 styled rifles are commonly owned at

high rates across many different demographic groups.

Table 6 shows the percentage of gun owners in each state who indicated that they have owned AR-15 styled rifles. Note that this question explicitly instructed respondents that “You can include any rifles of this style that have been modified or moved to be compliant with local law.” Thus, as with magazines, these answers can include firearms that are kept in other states, as well as firearms that were grandfathered in or modified to be compliant with local law, or respondents who have since sold or disposed of such guns. This presumably explains the relatively high rates of ownership in states that restrict the purchase or ownership of such firearms.

## 6 Conclusion

This report summarizes the main findings of the most comprehensive survey of firearms ownership and use conducted in the United States to date. While many of its estimates corroborate prior survey research in this area, it also provides unique insights that are relevant to timely public policy debates, particularly regarding the defensive use of firearms and the ownership and use of AR-15 styled rifles and magazines that hold over 10 rounds.

This survey finds firearms ownership rates slightly above those documented before the Covid-19 pandemic, which is consistent with other recent scholarly research finding a large surge in firearms purchases during the pandemic, particularly among first time buyers (Crifasi et al., 2021; Miller et al., 2022).

In sum, about 31.9% of U.S. adults, or 81.4 million Americans, own over 415 million firearms, consisting of approximately 171 million handguns, 146 million rifles, and 98 million shotguns. About 24.6 million individuals have owned up to 44 million AR-15 and similarly styled rifles, and 39 million individuals have owned up to 542 million magazines that hold over 10 rounds. Approximately a third of gun owners (31.1%) have used a firearm to defend themselves or their property, often on more than one occasion, and guns are used defensively by firearms owners in approximately 1.67 million incidents per year. A majority of gun owners (56.2%) indicate that they carry a handgun for self-defense in at least some circumstances, and about 35% of gun owners report carrying a handgun with some frequency.

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| State                | Owned AR-15 Style Rifle | 95% Confidence Interval |
|----------------------|-------------------------|-------------------------|
| Alabama              | 28.9%                   | 24.1% – 34.3%           |
| Alaska               | 37.0%                   | 24.4% – 51.6%           |
| Arizona              | 28.8%                   | 24.2% – 34.0%           |
| Arkansas             | 35.0%                   | 28.7% – 41.8%           |
| California           | 37.5%                   | 34.8% – 40.2%           |
| Colorado             | 33.3%                   | 27.7% – 39.5%           |
| Connecticut          | 21.8%                   | 15.3% – 30.2%           |
| Delaware             | 20.3%                   | 12.6% – 30.9%           |
| District of Columbia | 30.0%                   | 14.1% – 52.7%           |
| Florida              | 28.1%                   | 25.5% – 30.9%           |
| Georgia              | 31.4%                   | 27.9% – 35.1%           |
| Hawaii               | 34.6%                   | 19.1% – 54.3%           |
| Idaho                | 31.0%                   | 23.3% – 40.0%           |
| Illinois             | 32.6%                   | 28.7% – 36.7%           |
| Indiana              | 30.8%                   | 26.5% – 35.5%           |
| Iowa                 | 27.1%                   | 20.4% – 35.1%           |
| Kansas               | 28.4%                   | 22.4% – 35.4%           |
| Kentucky             | 29.9%                   | 25.2% – 35.1%           |
| Louisiana            | 27.5%                   | 22.0% – 33.7%           |
| Maine                | 22.0%                   | 14.6% – 31.6%           |
| Maryland             | 29.9%                   | 23.7% – 36.9%           |
| Massachusetts        | 33.8%                   | 26.9% – 41.4%           |
| Michigan             | 24.9%                   | 21.5% – 28.6%           |
| Minnesota            | 20.7%                   | 16.1% – 26.3%           |
| Mississippi          | 30.4%                   | 23.8% – 38.0%           |
| Missouri             | 28.0%                   | 23.8% – 32.7%           |
| Montana              | 26.8%                   | 16.8% – 39.8%           |
| Nebraska             | 22.4%                   | 15.3% – 31.8%           |
| Nevada               | 42.4%                   | 34.6% – 50.6%           |
| New Hampshire        | 23.2%                   | 14.0% – 36.0%           |
| New Jersey           | 30.7%                   | 25.7% – 36.2%           |
| New Mexico           | 29.5%                   | 19.4% – 42.1%           |
| New York             | 37.8%                   | 34.8% – 41.0%           |
| North Carolina       | 25.6%                   | 22.2% – 29.4%           |
| North Dakota         | 44.4%                   | 24.0% – 67.0%           |
| Ohio                 | 25.9%                   | 22.7% – 29.4%           |
| Oklahoma             | 29.3%                   | 24.1% – 35.0%           |
| Oregon               | 25.6%                   | 20.0% – 32.2%           |
| Pennsylvania         | 24.4%                   | 21.3% – 27.8%           |
| Rhode Island         | 29.7%                   | 17.3% – 46.1%           |
| South Carolina       | 25.3%                   | 21.0% – 30.2%           |
| South Dakota         | 35.8%                   | 26.8% – 45.9%           |
| Tennessee            | 28.9%                   | 24.8% – 33.3%           |
| Texas                | 36.0%                   | 33.3% – 38.7%           |
| Utah                 | 24.8%                   | 17.9% – 33.2%           |
| Virginia             | 26.0%                   | 21.9% – 30.6%           |
| Washington           | 35.3%                   | 30.3% – 40.6%           |
| West Virginia        | 27.4%                   | 21.3% – 34.5%           |
| Wisconsin            | 19.7%                   | 15.6% – 24.6%           |
| Wyoming              | 36.1%                   | 25.9% – 47.8%           |

Table 6: Percent of gun owners who have indicated that they have ever owned an AR-15 styled rifle by state. Note that this includes rifles that an owner holds in other locations if there are local ownership restrictions and rifles modified to be compliant with local laws.

Finally, the demographics of firearms ownership and defensive use are diverse, with different demographic groups commonly owning and using firearms at substantial rates.

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## Appendix A: Vermont Pilot Survey

An initial version of this survey was fielded in Vermont. We report below the top line results from the Vermont survey, which closely mirror the results of the national survey.

In sum, 572 Vermont residents were surveyed, of which 163 indicated owning firearms. The survey sample represented the demographics of Vermont well on all dimensions except gender, as women were over represented and comprised 65.2% of respondents. Thus, weights were employed for gender.

With weighting employed, we find that 30% of Vermont residents own a firearm. Given that the adult population of Vermont is approximately 486,000, this suggest that there are over 145,600 firearms owners in Vermont. 42.1% of Vermont firearms owners are estimated to be female and 57.9% male.

As Figure 16 illustrates, almost a third of gun owners (29.3%) reported having used a firearm to defend themselves or their property (not counting incidents that were due to military service, police work, or work as a security guard). In nearly half of these defensive gun uses (45.9%), respondents reported facing multiple assailants. 85.8% of all incidents were resolved without the firearm owner having to fire a shot (e.g. by simply showing a firearm or verbally threatening to use it).

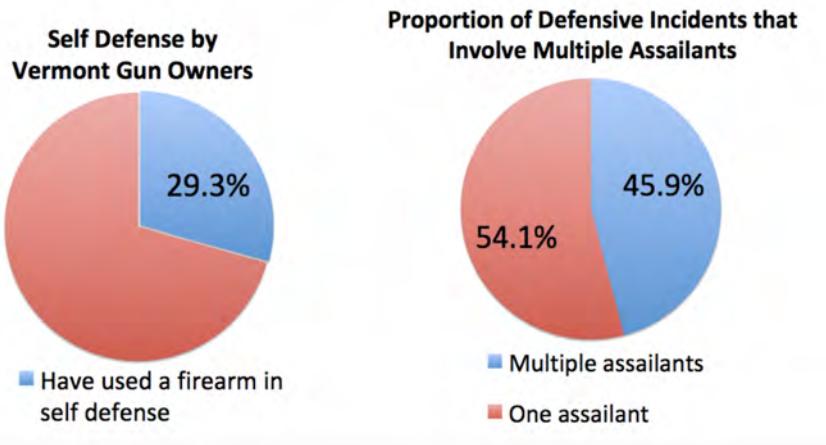


Figure 16: Proportion of gun owners in Vermont who have use a firearm in self-defense and number of assailants involved.

Sample of Vermont responses to open ended question prompt of “Have you ever been in a situation (including any referenced in earlier responses) in which it would have been useful for defensive purposes to have a firearm with a magazine capacity in excess of 10 rounds?”:

- in the first incident it was five to one. I was outnumbered. three rounds per person if needed
- The time I was assaulted by 10 individuals.
- Yes. We have bear that frequently come to our home. They've attempted to get into my truck, they have come onto our porch thru the dog door (XL size) they have been in our chicken coops and in our garage. They have damaged many items, destroyed gas grills and threatened my dogs and children. Sometimes a warning shot isn't enough. And if, God forbid, the bear turned and started to attack us multiple bullets would be needed to stop him.
- About 6 individuals broke into my house one night. I locked myself in my room and they tried to break my door down. I threatened them with use of deadly force, but they kept trying. One of them was outside and broke my bedroom window and I aimed my shotgun at him and he ran off. I threatened again with the sound of charging my shotgun that they knew I wasn't bluffing and they all fled. Had they entered with the intent to kill my family and I, then we would have been out numbered. If there was an exchange of gun fire, I wouldn't want to have the restriction of reloading within the time I needed to protect my family and myself. Outgun the enemy or the enemy will surely outgun you. Limiting everyone's right to weapons is not the answer, and clearly this attempt to ban high capacity magazines is just the catalyst to a government gun grab for easier totalitarian control of the population.
- Yes, i had two run ins with a mountain lion.
- We had a home invasion two times in a month
- Yes. We live in VT. Every time I fired my gun in defense of my property it was to deter bears from damaging my property. It takes more than 1 shot to scare a bear. If

it charges you or your family it'll definitely take a bunch of shots to stop the bear.

- Yes. Just because there are 10 rounds in a magazine does not mean all will be on target during a self defense incident. In 2012 while I was in college in Connecticut, I got jumped by 4 people in Hartford ct. I had nothing on me to defend myself. The men all threatened me with knives and handguns. I wish I was able to carry a firearm at that point.

## Appendix B: Sampling Proportions With and Without Weights for National Survey

| Gender | Initial Sample | Census Based         |
|--------|----------------|----------------------|
|        | Proportions    | Weighted Proportions |
| Male   | 49.32%         | 49.23%               |
| Female | 50.68%         | 50.77%               |

| Age Range | Initial Sample | Census Based         |
|-----------|----------------|----------------------|
|           | Proportions    | Weighted Proportions |
| 18-20     | 7.89%          | 5.04%                |
| 21-25     | 8.11%          | 8.58%                |
| 26-30     | 7.30%          | 9.24%                |
| 31-35     | 11.67%         | 8.67%                |
| 36-40     | 12.66%         | 8.44%                |
| 41-45     | 8.49%          | 7.70%                |
| 46-50     | 6.46%          | 8.09%                |
| 51-55     | 6.37%          | 8.13%                |
| 56-60     | 7.39%          | 8.52%                |
| 61-65     | 7.67%          | 7.87%                |
| 66-70     | 8.03%          | 6.59%                |
| 71-75     | 5.07%          | 5.13%                |
| 76-80     | 1.94%          | 3.50%                |
| Over 80   | 0.93%          | 4.49%                |

| Annual Household Income | Initial Sample Proportions | Census Based Weighted Proportions |
|-------------------------|----------------------------|-----------------------------------|
| Less than \$10,000      | 8.87%                      | 3.40%                             |
| \$10,000-20,000         | 8.95%                      | 4.89%                             |
| \$20,000-30,000         | 9.69%                      | 6.26%                             |
| \$30,000-40,000         | 8.78%                      | 7.06%                             |
| \$40,000-50,000         | 7.44%                      | 7.21%                             |
| \$50,000-60,000         | 7.72%                      | 6.96%                             |
| \$60,000-70,000         | 6.00%                      | 6.96%                             |
| \$70,000-80,000         | 6.37%                      | 6.37%                             |
| \$80,000-90,000         | 4.51%                      | 5.76%                             |
| \$90,000-100,000        | 5.89%                      | 5.76%                             |
| \$100,000-150,000       | 17.67%                     | 19.11%                            |
| Over \$150,000          | 8.12%                      | 20.23%                            |

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| State of Residence   | Initial Sample Proportions | Census Based Weighted Proportions |
|----------------------|----------------------------|-----------------------------------|
| Alabama              | 1.83%                      | 1.52%                             |
| Alaska               | 0.39%                      | 0.22%                             |
| Arizona              | 2.10%                      | 2.16%                             |
| Arkansas             | 1.10%                      | 0.91%                             |
| California           | 9.75%                      | 11.95%                            |
| Colorado             | 1.59%                      | 1.75%                             |
| Connecticut          | 1.23%                      | 1.09%                             |
| Delaware             | 0.56%                      | 0.30%                             |
| District of Columbia | 0.27%                      | 0.21%                             |
| Florida              | 7.29%                      | 6.51%                             |
| Georgia              | 3.67%                      | 3.24%                             |
| Hawaii               | 0.36%                      | 0.44%                             |
| Idaho                | 0.44%                      | 0.56%                             |
| Illinois             | 4.14%                      | 3.87%                             |
| Indiana              | 2.13%                      | 2.05%                             |
| Iowa                 | 0.91%                      | 0.96%                             |
| Kansas               | 0.92%                      | 0.89%                             |
| Kentucky             | 1.61%                      | 1.36%                             |
| Louisiana            | 1.23%                      | 1.41%                             |
| Maine                | 0.51%                      | 0.41%                             |
| Maryland             | 1.67%                      | 1.87%                             |
| Massachusetts        | 1.88%                      | 2.13%                             |
| Michigan             | 3.21%                      | 3.05%                             |
| Minnesota            | 1.36%                      | 1.73%                             |
| Mississippi          | 0.83%                      | 0.90%                             |
| Missouri             | 1.93%                      | 1.86%                             |
| Montana              | 0.25%                      | 0.33%                             |
| Nebraska             | 0.53%                      | 0.59%                             |
| Nevada               | 0.90%                      | 0.94%                             |
| New Hampshire        | 0.40%                      | 0.42%                             |
| New Jersey           | 2.97%                      | 2.81%                             |
| New Mexico           | 0.36%                      | 0.64%                             |
| New York             | 8.09%                      | 6.11%                             |
| North Carolina       | 3.18%                      | 3.16%                             |
| North Dakota         | 0.13%                      | 0.24%                             |
| Ohio                 | 4.13%                      | 3.57%                             |
| Oklahoma             | 1.32%                      | 1.20%                             |
| Oregon               | 1.05%                      | 1.28%                             |
| Pennsylvania         | 4.30%                      | 3.93%                             |
| Rhode Island         | 0.33%                      | 0.33%                             |
| South Carolina       | 1.68%                      | 1.55%                             |
| South Dakota         | 0.48%                      | 0.27%                             |
| Tennessee            | 2.18%                      | 2.09%                             |
| Texas                | 6.91%                      | 8.81%                             |
| Utah                 | 0.56%                      | 0.99%                             |
| Virginia             | 2.43%                      | 2.61%                             |
| Washington           | 2.03%                      | 2.33%                             |
| West Virginia        | 0.71%                      | 0.54%                             |
| Wisconsin            | 1.83%                      | 1.78%                             |
| Wyoming              | 0.32%                      | 0.17%                             |

| Race             | Initial Sample | Census Based         |
|------------------|----------------|----------------------|
|                  | Proportions    | Weighted Proportions |
| White            | 81.26%         | 76.30%               |
| Black            | 9.85%          | 13.40%               |
| Asian            | 3.98%          | 5.90%                |
| Native American  | 2.19%          | 1.30%                |
| Pacific Islander | 0.49%          | 0.20%                |
| Other            | 2.22%          | 2.90%                |

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# EXHIBIT 6

ER\_767



# Bureau of Justice Statistics Selected Findings

July 1995, NCJ-148201

## *Firearms, crime, and criminal justice*

# Guns Used in Crime

By Marianne W. Zawitz  
BJS Statistician

### How often are guns used in violent crimes?

According to the National Crime Victimization Survey (NCVS), almost 43.6 million criminal victimizations occurred in 1993, including 4.4 million violent crimes of rape and sexual assault, robbery, and aggravated assault. Of the victims of these violent crimes, 1.3 million (29%) stated that they faced an offender with a firearm.\*

In 1993, the FBI's *Crime in the United States* estimated that almost 2 million violent crimes of murder, rape, robbery, and aggravated assault were reported to the police by citizens. About 582,000 of these reported murders, robberies, and aggravated assaults were committed with firearms. Murder was the crime that most frequently involved firearms; 70% of the 24,526 murders in 1993 were committed with firearms.

### How do we know about the guns used by criminals?

No national collection of data contains detailed information about all of the guns used in crimes. Snapshots of

## Highlights

- Although most crime is not committed with guns, most gun crime is committed with handguns. *pages 1 & 2*
- Although most available guns are not used in crime, information about the 223 million guns available to the general public provides a context for evaluating criminal preferences for guns. *page 2*
- By definition, stolen guns are available to criminals. The FBI's National Crime Information Center (NCIC) stolen gun file contains over 2 million reports; 60% are reports of stolen handguns. *page 3*
- In 1994, the Bureau of Alcohol, Tobacco and Firearms (ATF) received over 85,132 requests from law enforcement agencies for traces of guns used in crime. Over three-quarters of the guns traced by the ATF in 1994 were handguns (mostly pistols), and almost a third were less than 3 years old. *page 4*
- Surveys of inmates show that they prefer concealable, large caliber guns. Juvenile offenders appear to be more likely to possess guns than adults. *page 5*
- Studies of the guns used in homicides show that large caliber revolvers are the most frequent type of gun used in homicides, but the number of large caliber semiautomatic guns used in murders is increasing. *page 5*
- Little information exists about the use of assault weapons in crime. The information that does exist uses varying definitions of assault weapons that were developed before the Federal assault weapons ban was enacted. *page 6*

information about the guns used by criminals are available from—

- official police records concerning the guns recovered in crimes and reports gathered from victims
- surveys that interview criminals
- surveys that interview victims of crime.

From these sources, we know how often guns are involved in crime, how guns are used in crime, what general categories of firearms are most often used in crime, and, to a limited extent, the specific types of guns most frequently used by criminals.

\* See note on page 7.

| <b>What are the different types of firearms?</b> |  | <b>Handguns are most often the type of firearm used in crime</b>  |
|--|--|---|
| <b>Types</b>                                     |  |   |
| <b>Handgun</b>                                   | A weapon designed to fire a small projectile from one or more barrels when held in one hand with a short stock designed to be gripped by one hand.   | <ul style="list-style-type: none"> <li>According to the Victim Survey (NCVS), 25% of the victims of rape and sexual assault, robbery, and aggravated assault in 1993 faced an offender armed with a handgun. Of all firearm-related crime reported to the survey, 86% involved handguns.</li> </ul>   |
| Revolver   | A handgun that contains its ammunition in a revolving cylinder that typically holds five to nine cartridges, each within a separate chamber. Before a revolver fires, the cylinder rotates, and the next chamber is aligned with the barrel.   | <ul style="list-style-type: none"> <li>The FBI's Supplemental Homicide Reports show that 57% of all murders in 1993 were committed with handguns, 3% with rifles, 5% with shotguns, and 5% with firearms where the type was unknown.</li> </ul>   |
| Pistol   | Any handgun that does not contain its ammunition in a revolving cylinder. Pistols can be manually operated or semiautomatic. A semiautomatic pistol generally contains cartridges in a magazine located in the grip of the gun. When the semiautomatic pistol is fired, the spent cartridge that contained the bullet and propellant is ejected, the firing mechanism is cocked, and a new cartridge is chambered.   | <ul style="list-style-type: none"> <li>The 1991 Survey of State Prison Inmates found that violent inmates who used a weapon were more likely to use a handgun than any other weapon; 24% of all violent inmates reported that they used a handgun. Of all inmates, 13% reported carrying a handgun when they committed the offense for which they were serving time.</li> </ul> |
| Derringer  | A small single- or multiple-shot handgun other than a revolver or semiautomatic pistol.  |   |
| <b>Rifle</b>                                     | A weapon intended to be fired from the shoulder that uses the energy of the explosive in a fixed metallic cartridge to fire only a single projectile through a rifled bore for each single pull of the trigger.  |   |
| <b>Shotgun</b>                                   | A weapon intended to be fired from the shoulder that uses the energy of the explosive in a fixed shotgun shell to fire through a smooth bore either a number of ball shot or a single projectile for each single pull of the trigger.  |   |
| <b>Firing action</b>                             |  | <b>What types of guns do criminals prefer?</b>  |
| Fully automatic                                  | Capability to fire a succession of cartridges so long as the trigger is depressed or until the ammunition supply is exhausted. Automatic weapons are considered machineguns subject to the provisions of the National Firearms Act.  | Research by Wright and Rossi in the 1980's found that most criminals prefer guns that are easily concealable, large caliber, and well made. Their studies also found that the handguns used by the felons interviewed were similar to the handguns available to the general public, except that the criminals preferred larger caliber guns.                                    |
| Semiautomatic                                    | An autoloading action that will fire only a single shot for each single function of a trigger.   |   |
| Machinegun                                       | Any weapon that shoots, is designed to shoot, or can be readily restored to shoot automatically more than one shot without manual reloading by a single function of the trigger.   |   |
| Submachinegun                                    | A simple fully automatic weapon that fires a pistol cartridge that is also referred to as a machine pistol.  |   |
| <b>Ammunition</b>                                |  | <b>What types of guns are available generally?</b>  |
| Caliber  | The size of the ammunition that a weapon is designed to shoot, as measured by the bullet's approximate diameter in inches in the United States and in millimeters in other countries. In some instances, ammunition is described with additional terms, such as the year of its introduction (.30/06) or the name of the designer (.30 Newton). In some countries, ammunition is also described in terms of the length of the cartridge case (7.62 x 63 mm). | The Bureau of Alcohol, Tobacco and Firearms (ATF) estimates that from 1899 to 1993 about 223 million guns became available in the United States, including over 79 million rifles, 77 million handguns, and 66 million shotguns. The number of guns seized, destroyed, lost, or not working is unknown.   |
| Gauge  | For shotguns, the number of spherical balls of pure lead, each exactly fitting the bore, that equals one pound.  | The number of new handguns added to those available has exceeded the number of new shotguns and rifles in recent years. More than half of the guns added in 1993 were handguns.   |

Sources: ATF, *Firearms & Explosives Tracing Guidebook*, September 1993, pp. 35-40, and Paul C. Giannelli, "Ballistics Evidence: Firearms Identification," *Criminal Law Bulletin*, May-June 1991, pp. 195-215.

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Over 40 million handguns have been produced in the United States since 1973.

Since over 80% of the guns available in the United States are manufactured here, gun production is a reasonable indicator of the guns made available. From 1973 to 1993, U.S. manufacturers produced—

- 6.6 million .357 Magnum revolvers
- 6.5 million .38 Special revolvers
- 5.4 million .22 caliber pistols
- 5.3 million .22 caliber revolvers
- 4.5 million .25 caliber pistols
- 3.1 million 9 millimeter pistols
- 2.4 million .380 caliber pistols
- 2.2 million .44 Magnum revolvers
- 1.7 million .45 caliber pistols
- 1.2 million .32 caliber revolvers.

During the two decades from 1973 to 1993, the types of handguns most frequently produced have changed. Most new handguns are pistols rather than revolvers. Pistol production grew from 28% of the handguns produced in the United States in 1973 to 80% in 1993.

The number of large caliber pistols produced annually increased substantially after 1986. Until the mid-1980's, most pistols produced in the United States were .22 and .25 caliber models. Production of .380 caliber and 9 millimeter pistols began to increase substantially in 1987, so that by 1993 they became the most frequently produced pistols. From 1991 to 1993, the last 3 years for which data are available, the most frequently produced handguns were—

- .380 caliber pistols (20%)
- 9 millimeter pistols (19%)
- .22 caliber pistols (17%)
- .25 caliber pistols (13%)
- .50 caliber pistols (8%).

### **Stolen guns are a source of weapons for criminals**

All stolen guns are available to criminals by definition. Recent studies of adult and juvenile offenders show that many have either stolen a firearm or kept, sold, or traded a stolen firearm:

- According to the 1991 Survey of State Prison Inmates, among those inmates who possessed a handgun, 9% had acquired it through theft, and 28% had acquired it through an illegal market such as a drug dealer or fence. Of all inmates, 10% had stolen at least one gun, and 11% had sold or traded stolen guns.

- Studies of adult and juvenile offenders that the Virginia Department of Criminal Justice Services conducted in 1992 and 1993 found that 15% of the adult offenders and 19% of the juvenile offenders had stolen guns; 16% of the adults and 24% of the juveniles had kept a stolen gun; and 20% of the adults and 30% of the juveniles had sold or traded a stolen gun.

- From a sample of juvenile inmates in four States, Sheley and Wright found that more than 50% had stolen a gun at least once in their lives and 24% had stolen their most recently obtained handgun. They concluded that theft and burglary were the original, not always the proximate, source of many guns acquired by the juveniles.

### **How many guns are stolen?**

The Victim Survey (NCVS) estimates that there were 341,000 incidents of firearm theft from private citizens annually from 1987 to 1992. Because the survey does not ask how many guns were stolen, the number of guns stolen probably exceeds the number of incidents of gun theft.

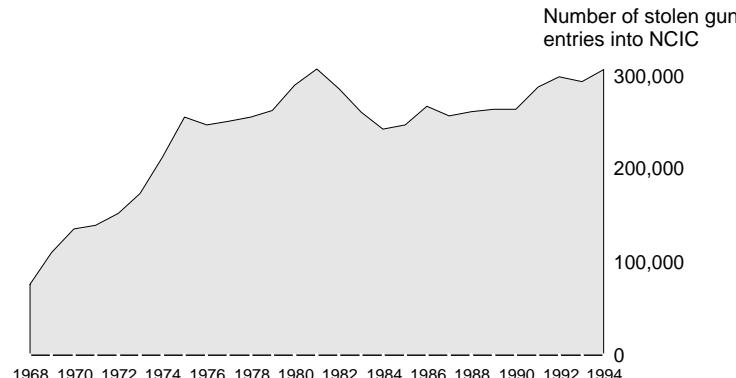
The FBI's National Crime Information Center (NCIC) stolen gun file contained over 2 million reports as of March 1995. In 1994, over 306,000 entries were added to this file including a variety of guns, ammunition, cannons, and grenades. Reports of stolen guns are included in the NCIC files when citizens report a theft to law enforcement agencies that submit a report to the FBI. All entries must include make, caliber, and serial number. Initiated in 1967, the NCIC stolen gun file retains all entries indefinitely unless a recovery is reported.

### **Most stolen guns are handguns**

Victims report to the Victim Survey that handguns were stolen in 53% of the thefts of guns. The FBI's stolen gun file's 2 million reports include information on—

- 1.26 million handguns (almost 60%)
- 470,000 rifles (22%)
- 356,000 shotguns (17%).

### **From 1985 to 1994, the FBI received an annual average of over 274,000 reports of stolen guns**



Source: FBI, National Crime Information Center, 1995.

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### How many automatic weapons are stolen?

Under the provisions of the National Firearms Act, all automatic weapons such as machine guns must be registered with the ATF. In 1995, over 240,000 automatic weapons were registered with the ATF. As of March 1995, the NCIC stolen gun file contained reports on about 7,700 machine guns and submachine guns.

### What types of handguns are most frequently stolen?

Most frequently reported handguns in the NCIC stolen gun file

| Percent of stolen handguns | Number  | Caliber | Type          |
|----------------------------|---------|---------|---------------|
| 20.5%                      | 259,184 | .38     | Revolver      |
| 11.7                       | 147,681 | .22     | Revolver      |
| 11.6                       | 146,474 | .357    | Revolver      |
| 8.8                        | 111,558 | 9 mm    | Semiautomatic |
| 7.0                        | 87,714  | .25     | Semiautomatic |
| 6.7                        | 84,474  | .22     | Semiautomatic |
| 5.4                        | 68,112  | .380    | Semiautomatic |
| 3.7                        | 46,503  | .45     | Semiautomatic |
| 3.3                        | 41,318  | .32     | Revolver      |
| 3.1                        | 39,254  | .44     | Revolver      |
| 1.5                        | 18,377  | .32     | Semiautomatic |
| 1.3                        | 16,214  | .45     | Revolver      |

### Upon request, the ATF traces some guns used in crime to their origin

The National Tracing Center of ATF traces firearms to their original point of sale upon the request of police agencies. The requesting agency can use this information to assist in identifying suspects, providing evidence for subsequent prosecution, establishing stolen status, and proving ownership. The number of requests for firearms traces increased from 37,181 in 1990 to 85,132 in 1994.

Trace requests represent an unknown portion of all the guns used in crimes. ATF is not able to trace guns manufactured before 1968, most surplus military weapons, imported guns without the importer's name, stolen guns, and guns missing a legible serial number.

Police agencies do not request traces on all firearms used in crimes. Not all firearms used in crimes are recovered so that a trace could be done and, in some States and localities, the police agencies may be able to establish ownership locally without going to the ATF.

### Most trace requests concern handguns

Over half of the guns that police agencies asked ATF to trace were pistols and another quarter were revolvers.

| Type of gun                | Percent of all 1994 traces |
|----------------------------|----------------------------|
| Total                      | 100.0%                     |
| Handgun                    | 79.1                       |
| Pistol                     | 53.0                       |
| Pistol Revolver            | 24.7                       |
| Pistol Derringer           | 1.4                        |
| Rifle                      | 11.1                       |
| Shotgun                    | 9.7                        |
| Other including machinegun | 0.1                        |

While trace requests for all types of guns increased in recent years, the number of pistols traced increased the most, doubling from 1990 to 1994.

### What are the countries of origin of the guns that are traced?

Traced guns come from many countries across the globe. However, 78% of the guns that were traced in 1994 originated in the United States and most of the rest were from —

- Brazil (5%)
- Germany (3%)
- China (3%)
- Austria (3%)
- Italy (2%)
- Spain (2%).

### Almost a third of the guns traced by ATF in 1994 were 3 years old or less

| Age of traced guns | Traces completed in 1994 |         |
|--------------------|--------------------------|---------|
|                    | Number                   | Percent |
| Total              | 83,362                   | 100%    |
| Less than 1 year   | 4,072                    | 5       |
| 1 year             | 11,617                   | 14      |
| 2 years            | 6,764                    | 8       |
| 3 years            | 4,369                    | 5       |

### What crimes are most likely to result in a gun-tracing request?

| Crime type       | Percent of all 1994 traces | Percent of traces by crime type |       |        |                  |                 |       |         |
|------------------|----------------------------|---------------------------------|-------|--------|------------------|-----------------|-------|---------|
|                  |                            | Handgun                         |       |        |                  |                 |       |         |
|                  |                            | Total                           | Total | Pistol | Pistol Derringer | Pistol Revolver | Rifle | Shotgun |
| Weapons offenses | 72%                        | 100%                            | 81%   | 55%    | 1%               | 25%             | 10%   | 9%      |
| Drug offenses    | 12                         | 100                             | 75    | 50     | 2                | 23              | 14    | 11      |
| Homicide         | 6                          | 100                             | 79    | 49     | 1                | 29              | 11    | 10      |
| Assault          | 5                          | 100                             | 80    | 50     | 1                | 28              | 10    | 11      |
| Burglary         | 2                          | 100                             | 57    | 34     | 1                | 22              | 24    | 19      |
| Robbery          | 2                          | 100                             | 84    | 53     | 1                | 29              | 7     | 10      |
| Other            | 2                          | 100                             | 76    | 54     | 1                | 21              | 14    | 10      |

Note: Detail may not add to total because of rounding.

Source: ATF, unpublished data, May 1995.

### What guns are the most frequently traced?

The most frequently traced guns vary from year to year. The ATF publishes a list of the 10 specific guns most frequently traced annually. The total number of traced guns on the top 10 list was 18% of the total traced from 1991 to 1994. Most of the top 10 guns were pistols (over 30% were .25 caliber pistols), although a number of revolvers and a few shotguns and rifles were also included. The most frequently traced gun was a Smith and Wesson .38 caliber revolver in 1990, the Raven Arms P25 (a .25 caliber pistol) from 1991 through 1993, and the Lorcin P25 in 1994.

### 10 most frequently traced guns in 1994

| Rank | Manufacturer     | Model | Caliber | Type    | Number traced |
|------|------------------|-------|---------|---------|---------------|
| 1    | Lorcin           | P25   | .25     | Pistol  | 3,223         |
| 2    | Davis Industries | P380  | .38     | Pistol  | 2,454         |
| 3    | Raven Arms       | MP25  | .25     | Pistol  | 2,107         |
| 4    | Lorcin           | L25   | .25     | Pistol  | 1,258         |
| 5    | Mossburg         | 500   | 12G     | Shotgun | 1,015         |
| 6    | Phoenix Arms     | Raven | .25     | Pistol  | 959           |
| 7    | Jennings         | J22   | .22     | Pistol  | 929           |
| 8    | Ruger            | P89   | 9 mm    | Pistol  | 895           |
| 9    | Glock            | 17    | 9 mm    | Pistol  | 843           |
| 10   | Bryco            | 38    | .38     | Pistol  | 820           |

Source: ATF, May 1995.

### What caliber guns do criminals prefer?

In their 1983 study, Wright, Rossi, and Daly asked a sample of felons about the handgun they had most recently acquired. Of the felons sampled—

- 29% had acquired a .38 caliber handgun
- 20% had acquired a .357 caliber handgun
- 16% had acquired a .22 caliber handgun.

Sheley and Wright found that the juvenile inmates in their 1991 sample in four States preferred large caliber, high quality handguns. Just prior to their confinement—

- 58% owned a revolver, usually a .38 or .357 caliber gun
- 55% owned a semiautomatic handgun, usually a 9 millimeter or .45 caliber gun
- 51% owned a sawed-off shotgun
- 35% owned a military-style automatic or semiautomatic rifle.

### Do juvenile offenders use different types of guns than adult offenders?

A study of adult and juvenile offenders by the Virginia Department of Criminal Justice Services found that juvenile offenders were more likely than adults to have carried a semiautomatic pistol at the crime scene (18% versus 7%).

They were also more likely to have carried a revolver (10% versus 7%). The same proportion of adults and juveniles (3%) carried a shotgun or rifle at the crime scene.

### Some studies of guns used in homicides provide information about caliber

McGonigal and colleagues at the University of Pennsylvania Medical Center studied firearm homicides that occurred in Philadelphia: 145 in 1985 and 324 in 1990. Most of the firearms used in the homicides studied were handguns: 90% in 1985 and 95% in 1990. In both years, revolvers were the predominant type of handgun used; however, the use of semiautomatic pistols increased from 24% in 1985 to 38% in 1990. The caliber of the handguns used also changed:

#### In Philadelphia, handguns most often used:

| In 1985, of 91<br>homicides | In 1990, of 204<br>homicides |
|-----------------------------|------------------------------|
| 44% .38 caliber<br>revolver | 23% 9 mm pistol              |
| 19% .25 caliber<br>pistol   | 18% .38 caliber<br>revolver  |
| 14% .22 caliber<br>revolver | 16% .357 caliber<br>revolver |
| 14% .32 caliber<br>revolver | 16% .22 caliber<br>revolver  |
| 3% 9 mm pistol              | 10% .32 caliber<br>revolver  |
| 2% .357 caliber<br>revolver | 6% .380 caliber<br>pistol    |

The Virginia Department of Criminal Justice Services studied 844 homicides that occurred in 18 jurisdictions

from 1989 through 1991. Firearms were identified as the murder weapon in 600 cases. Over 70% of the firearms used were handguns. Of those handguns for which the caliber and firing action could be identified, 19% were .38 caliber revolvers, 10% were .22 caliber revolvers, and 9% were 9 millimeter semiautomatic pistols.

The Hawaii Department of the Attorney General, Crime Prevention Division, studied 59 firearm-related homicides in Honolulu from 1988 to 1992. Handguns were used in 48 homicides (over 80%) including 11 handguns of 9 millimeter caliber, 10 of .357 caliber, 10 of .38 caliber, and 5 of .25 caliber.

### What caliber guns are used in the killings of law enforcement officers?

From 1982 to 1993, of the 687 officers who were killed by firearms other than their own guns, more were killed by .38 caliber handguns than by any other type of weapon.

| Type of firearm      | Percent of law enforcement officers killed with a firearm |
|----------------------|---|
| .38 caliber handgun  | 25.2%   |
| .357 Magnum handgun  | 12.1  |
| 9 millimeter handgun | 9.5   |
| 12 gauge shotgun     | 7.4   |
| .22 caliber handgun  | 5.4   |
| .22 caliber rifle    | 4.4   |

## How often are assault weapons used in crime?

Little information exists about the use of assault weapons in crime. The information that does exist uses varying definitions of assault weapons that were developed before the Federal assault weapons ban was enacted.

In general, assault weapons are semiautomatic firearms with a large magazine of ammunition that were designed and configured for rapid fire and combat use. An assault weapon can be a pistol, a rifle, or a shotgun. The Federal Violent Crime Control and Law Enforcement Act of 1994 bans the manufacture and sale of 19 specific assault weapons identified by make and manufacturer. It also provides for a ban on those weapons that have a combination of features such as flash suppressors and grenade launchers. The ban does not cover those weapons legally possessed before the law was enacted. The National Institute of Justice will be evaluating the effect of the ban and reporting to Congress in 1997.

In 1993 prior to the passage of the assault weapons ban, the Bureau of Alcohol, Tobacco and Firearms (ATF), reported that about 1% of the estimated 200 million guns

in circulation were assault weapons. Of the gun-tracing requests received that year by ATF from law enforcement agencies, 8% involved assault weapons.

### Assault weapons and homicide

A New York State Division of Criminal Justice Services study of homicides in 1993 in New York City found that assault weapons were involved in 16% of the homicides studied. The definition of assault weapons used was from proposed but not enacted State legislation that was more expansive than the Federal legislation. By matching ballistics records and homicide files, the study found information on 366 firearms recovered in the homicides of 271 victims. Assault weapons were linked to the deaths of 43 victims (16% of those studied).

A study by the Virginia Department of Criminal Justice Services reviewed the files of 600 firearm murders that occurred in 18 jurisdictions from 1989 to 1991. The study found that handguns were used in 72% of the murders (431 murders). Ten guns were identified as assault weapons, including five pistols, four rifles, and one shotgun.

## Assault weapons and offenders

In the 1991 BJS Survey of State Inmates, about 8% of the inmates reported that they had owned a military-type weapon, such as an Uzi, AK-47, AR-15, or M-16. Less than 1% said that they carried such a weapon when they committed the incident for which they were incarcerated. A Virginia inmate survey conducted between November 1992 and May 1993 found similar results: About 10% of the adult inmates reported that they had ever possessed an assault rifle, but none had carried it at the scene of a crime.

Two studies indicate higher proportions of juvenile offenders reporting possession and use of assault rifles. The Virginia inmate survey also covered 192 juvenile offenders. About 20% reported that they had possessed an assault rifle and 1% said that they had carried it at the scene of a crime. In 1991, Sheley and Wright surveyed 835 serious juvenile offenders incarcerated in 6 facilities in 4 States. In the Sheley and Wright study, 35% of the juvenile inmates reported that they had owned a military-style automatic or semiautomatic rifle just prior to confinement.

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**Note**

Data in this report from the 1993 National Crime Victimization Survey are the first released on this topic since the survey was redesigned. Because of changes in the methodology, direct comparisons with BJS's victim survey data from prior years are not appropriate. Additional information about the survey's redesign can be obtained from the Bureau of Justice Statistics Clearinghouse at 1-800-732-3277.

The Bureau of Justice Statistics is the statistical arm of the U.S. Department of Justice. Jan M. Chaiken, Ph.D., is director.

BJS Selected Findings summarize statistics about a topic of current concern from both BJS and non-BJS datasets.

Substantial assistance in preparing this document was provided by Roy Weise and Gary Boatman of the Criminal Justice Information Systems Division of the FBI; Edward Troiano, Emmett Masterson, Gerald Nunziato, Gary Kirchoff, and Kris Denholm of the Bureau of Alcohol, Tobacco and Firearms; Jim McDonough of the Virginia Department of Criminal Justice Services; Henry Brownstein and Kelly Haskin-Tenenini of the New York State Division of Criminal Justice Services; and Larry Greenfeld, Thomas Hester, and Michael Rand of the Bureau of Justice Statistics. Verification and publication review were provided by Yvonne Boston, Ida Hines, Rhonda Keith, and Priscilla Middleton of the Bureau of Justice Statistics.

July 1995, NCJ-148201

*Guns Used in Crime* is the first of a series of reports on firearms and crime that will become part of a longer document, *Firearms, Crime, and Criminal Justice*. Other topics to be covered in this series include weapons offenses and offenders, how criminals obtain guns, and intentional firearm injury. The full report will focus on the use of guns in crime, trends in gun crime, consequences of gun crimes, characteristics of offenders who use guns, and sanctions for offenders who use guns. This report will not cover the involvement of firearms in accidents or suicides.

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# EXHIBIT 7

**ER\_775**

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**ANNUAL FIREARMS MANUFACTURING AND EXPORT REPORT****YEAR 2020 Final\*****MANUFACTURED*****PISTOLS***

|              |                  |              |                |
|--------------|------------------|--------------|----------------|
| TO .22       | 678,967          | TO .22       | 597,015        |
| TO .25       | 195,992          | TO .32       | 4,124          |
| TO .32       | 56,887           | TO .357 MAG  | 152,921        |
| TO .380      | 659,899          | TO .38 SPEC  | 181,585        |
| TO 9MM       | 3,211,775        | TO .44 MAG   | 27,151         |
| TO .50       | 705,663          | TO .50       | 30,282         |
| <b>TOTAL</b> | <b>5,509,183</b> | <b>TOTAL</b> | <b>993,078</b> |

|                       |           |
|-----------------------|-----------|
| <b>RIFLES</b>         | 2,760,392 |
| <b>SHOTGUNS</b>       | 476,682   |
| <b>MISC. FIREARMS</b> | 1,324,743 |

**EXPORTED**

|                       |         |
|-----------------------|---------|
| <b>PISTOLS</b>        | 382,758 |
| <b>REVOLVERS</b>      | 19,264  |
| <b>RIFLES</b>         | 99,454  |
| <b>SHOTGUNS</b>       | 17,874  |
| <b>MISC. FIREARMS</b> | 9,788   |

\* FOR PURPOSES OF THIS REPORT ONLY, "PRODUCTION" IS DEFINED AS:  
 FIREARMS, INCLUDING SEPARATE FRAMES OR RECEIVERS, ACTIONS OR  
 BARRELED ACTIONS, MANUFACTURED AND DISPOSED OF IN COMMERCE  
 DURING THE CALENDAR YEAR.

PREPARED BY LED 03/10/2021  
 REPORT DATA AS OF 03/10/2021

Case 3:17-cv-01017-BEN-JLB Document 132-2 Filed 12/01/22 PageID.17095 Page 82 of 82

**CERTIFICATE OF SERVICE**  
**UNITED STATES DISTRICT COURT**  
**SOUTHERN DISTRICT OF CALIFORNIA**

Case Name: *Duncan, et al. v. Becerra*  
Case No.: 17-cv-1017-BEN-JLB

**IT IS HEREBY CERTIFIED THAT:**

I, the undersigned, declare under penalty of perjury that I am a citizen of the United States over 18 years of age. My business address is 180 East Ocean Boulevard, Suite 200 Long Beach, CA 90802. I am not a party to the above-entitled action.

I have caused service of the following documents, described as:

**DECLARATION OF MARK HANISH IN SUPPORT OF PLAINTIFFS'  
SUPPLEMENTAL BRIEF; EXHIBITS 2-7**

on the following parties by electronically filing the foregoing on December 1, 2022, with the Clerk of the District Court using its ECF System, which electronically notifies them.

Rob Bonta  
Attorney General of California  
Mark R. Beckington  
Supervising Deputy Attorney General  
Kevin J. Kelly  
Deputy Attorney General  
300 South Spring Street, Suite 1702  
Los Angeles, CA 90013  
[kevin.kelly@doj.ca.gov](mailto:kevin.kelly@doj.ca.gov)

I declare under penalty of perjury that the foregoing is true and correct.  
Executed on December 1, 2022, at Long Beach, CA.

Laura Palmerin

## CERTIFICATE OF SERVICE

17cv1017

Case 3:17-cv-01017-BEN-JLB Document 132-3 Filed 12/01/22 PageID.17096 Page 1 of 68

1 C.D. Michel – SBN 144258  
2 Sean A. Brady – SBN 262007  
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4 Matthew D. Cubeiro – SBN 291519  
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6 Attorneys for Plaintiffs  
7

8 IN THE UNITED STATES DISTRICT COURT  
9 FOR THE SOUTHERN DISTRICT OF CALIFORNIA

10 VIRGINIA DUNCAN, et al.,  
11 Plaintiffs,

12 v.  
13 XAVIER BECERRA, in his official  
14 capacity as Attorney General of the State  
of California,  
15 Defendant.

Case No: 17-cv-1017-BEN-JLB

**DECLARATION OF DR. CARLISLE  
E. MOODY IN SUPPORT OF  
PLAINTIFFS' SUPPLEMENTAL  
BRIEF; EXHIBITS 8-9**

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1                   **DECLARATION OF DR. CARLISLE E. MOODY**

2         1. I am Carlisle E. Moody, Professor of Economics at the College of  
3         William & Mary. Counsel for plaintiffs in this matter have asked me to confirm my  
4         prior expert witness report in this matter. I have personal knowledge of the facts set  
5         forth herein and, if called and sworn as a witness, could and would testify  
6         competently thereto.

7         2. Attached hereto as **Exhibit 8** is a true and correct copy of my signed  
8         expert witness rebuttal dated November 3, 2017. Exhibit 1 contains my opinions and  
9         analysis relevant to this matter.

10        3. Attached hereto as **Exhibit 9** is a true and correct copy of my most recent  
11        curriculum vitae, which describes my background, qualifications, and areas of  
12        expertise.

13        4. While I was unable to update my work in time to reflect post-2017 data, I  
14        confirm that I stand by my conclusion in Exhibit A, which was that I am unable to  
15        find any effect of ammunition magazines capable of holding more than 10 rounds or  
16        California's ban on such magazines on murders or gun homicides. More criminals  
17        using more guns with magazines capable of holding more than 10 rounds apparently  
18        do not cause more homicides. Such magazines appear to have nothing to do with  
19        homicide.

20        5. It is my expert opinion that California's ban on acquiring magazines  
21        capable of holding more than 10 rounds has not and will not, even when paired with a  
22        possession ban, result in any statistically significant reduction in the number or  
23        lethality of mass shooting incidents in California or violent crime rates in general.

24        I declare under penalty of perjury that the foregoing is true and correct.  
25        Executed within the United States on November 24, 2022.

26                     
27                   Dr. Carlisle E. Moody  
28                   Declarant

Case 3:17-cv-01017-BEN-JLB Document 132-3 Filed 12/01/22 PageID.17098 Page 3 of 68

# EXHIBIT 8

**ER\_780**

**Expert Witness Rebuttal of Dr. Carlisle E. Moody**

*Duncan, et al. v. Becerra, et al.*  
United States District Court (S.D. Cal.)  
Case No: 3:17-cv-01017-BEN-JLB  
November 30, 2022

**I. INTRODUCTION**

I am Dr. Carlisle E. Moody, Professor of Economics at the College of William & Mary. Counsel for plaintiffs in *Duncan v. Becerra* (S.D. Cal. Case No. 3:17-cv-01017-BEN-JLB) have asked me to offer a rebuttal opinion regarding this case. This report sets forth my qualifications, opinions, and scholarly foundation for those opinions.

**II. BACKGROUND & QUALIFICATIONS**

I am a Professor of Economics at the College of William and Mary in Virginia. I graduated from Colby College in 1965 with a major in Economics. I received my graduate training from the University of Connecticut, earning a Master of Economics degree in 1966 and a Ph.D. in Economics in 1970, with fields in mathematical economics and econometrics.

I began my academic career in 1968 as Lecturer in Econometrics at the University of Leeds, Leeds, England. In 1970 I joined the Economics Department at William and Mary as an Assistant Professor, I was promoted to Associate Professor in 1975 and to full Professor in 1989. I was Chair of the Economics Department from 1997-2003. I am still teaching full time at William and Mary. I teach undergraduate and graduate courses in Econometrics, Mathematical Economics, and Time Series Analysis.

I have published over 40 refereed journal articles and several articles in law journals and elsewhere. Nearly all these articles analyze government policies of various sorts. I have been doing research in guns, crime, and gun policy since 2000. I have published 11 articles directly related to guns and gun policy.

I have also consulted for a variety of private and public entities, including the United States Department of Energy, U.S. General Accountability Office, Washington Consulting Group, Decision Analysis Corporation of Virginia, SAIC Corporation, and the Independence Institute.

A full list of my qualifications, as well as a list of my publications, is attached hereto as **Exhibit 1**.

In the past four years, I have written export reports, been deposed, or testified at trial in the following matters:

- *Cooke v. Hickenlooper*, U.S. Dist. Ct., Dist. of Colo., Oct. 25, 2013 (submitted expert report, not deposed, did not testify);
- *Rocky Mountain Gun Owners v. Hickenlooper*, Dist. Ct., City and County of Denver, Case No. 2013-CV-33897, May 1, 2017 (testified).
- *William Wiese, et al v. Becerra*, U.S. Dist. Ct., E. Dist. of Cal., Case No. 2:17-cv-00903-WBS-KJN, April 28, 2017 (submitted expert report, not deposed, did not testify)

### **III. COMPENSATION**

I am being compensated for my time in this case at an hourly rate of \$250 per hour. My compensation is not contingent on the results of my analysis or the substance of my testimony.

### **IV. ASSIGNMENT**

Plaintiffs' counsel has asked me to provide an opinion in response to the opinions presented in the expert reports submitted by Attorney General Xavier Becerra—specifically those of Dr. Louis Klarevas and Dr. Christopher S. Koper.

### **V. SUMMARY OF OPINIONS**

The defense's experts posit that magazines over ten rounds increase the number of shots fired in mass shooting incidents and other violent crimes leading to more deaths and injuries. The conclusion they come to is that a ban on such magazines has the potential to reduce deaths and injuries sustained in such events. The defense's experts, however, provide no relevant evidence showing that California's ban would reduce deaths or injuries.

Koper presents evidence concerning the federal weapons ban in effect from 1994-2004, a nationwide ban on (among other things) magazines over ten rounds. His opinion regarding the effectiveness of that ban is largely irrelevant here because the challenged law is limited to California. Koper presents no evidence at all concerning the effectiveness of California's magazine ban, specifically, or statewide bans, more generally.

Klarevas presents some weak evidence that states with magazine bans have had fewer incidents of mass shootings and fewer people killed in mass shootings than states without such bans. He does not present any evidence that the California ban has had any effect, thereby rendering his report irrelevant.

It is my professional opinion, based on my training in economics, econometrics, and policy analysis, my expertise relevant to gun policy, including

bans on “large capacity magazines,”<sup>1</sup> as well as my review and analysis of the relevant data that: (1) California’s current ban on acquiring magazines over ten rounds<sup>2</sup> has not had any statistically significant impact on violent crime, including mass shootings, in California; (2) legally possessed magazines over ten rounds (i.e., those that were “grandfathered in” after the state banned acquisition) are not commonly used in mass shootings in California; and (3) bans on such magazines have no effect on violent crime, as illustrated by the results of the Washington Post study of firearms recovered by Virginia law enforcement.

In short, it is my expert opinion that California’s acquisition ban has not and will not, even when paired with a possession ban, result in any statistically significant reduction in the number or lethality of mass shooting incidents in California or violent crime rates in general.

## **VI. OPINIONS & ANALYSIS**

### **A. California’s LCM Acquisition Ban Has Had No Statistically Significant Impact on Violent Crime in California**

#### **1. A Primer on Policy Analysis Using Regression Models<sup>3</sup>**

A regression model estimates the possible linear relationship between the dependent (outcome) variable, say the California murder rate, and a set of explanatory variables such as the 1994 assault weapon ban and the California LCM ban. The law variables are so-called “dummy” variables which equal one in those years the law was in effect, zero otherwise. I also include a trend consisting of the numbers 1,2,3, etc. for the years in the sample. The coefficient on the trend shows by how much the murder rate changes each year due to all other factors that affect the murder rate aside from the variables included in the regression model. These

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<sup>1</sup> California law defines a “large capacity magazine” as, with limited exceptions, “any ammunition feeding device with the capacity to accept more than 10 rounds.” Cal. Penal Code § 16740. I understand that this is not a universally accepted definition. But, for ease of reference, I refer to magazines over ten rounds as “large capacity magazines” or “LCMs” throughout this report.

<sup>2</sup> It is my understanding, and I have assumed for purposes of this study, that California has prohibited the manufacture, importation, sale, giving, lending, buying, and receiving of magazines over ten rounds since the enactment of Senate Bill 23 (“SB 23”), which is codified at California Penal Code section 32310(a) and took effect on January 1, 2000. I refer to this prohibition as California’s “acquisition ban” throughout this report.

<sup>3</sup> Readers who are familiar with statistical methodology applied to policy analysis can skip this section.

factors include changes in trauma treatment that turn potential murders into assaults, the advent of 911 calls, cell phones, DNA, the national fingerprint directory, ubiquitous security cameras, smartphones with cameras, body cameras on police officers, etc. etc. If the trend is omitted, these influences on crime which are separate and distinct from the effect of any law, will be incorrectly attributed to the LCM ban. I also include a dummy variable for the years 1994-2004 to estimate the effect of the national LCM ban due to the Federal assault weapon ban. If that variable is omitted, the effect of the national ban is incorrectly attributed to the state ban. I also include some variables that are routinely included in almost any crime model: the proportion of the population between 15 and 29, the unemployment rate, income per capita, and a dummy variable for the years of the crack epidemic, 1984-1991.

The coefficient on the California LCM acquisition ban variable estimates the change in the dependent variable, e.g., the murder rate, due to the implementation of the acquisition ban, holding constant the effects of the national ban, the effects of the factors captured by the trend, and the effects of the crack epidemic, income, and unemployment. If the California acquisition ban has been effective in reducing murder, we would expect a negative and significant coefficient on the LCM ban dummy variable indicating a reduction in murder as a result of the ban.

Even if an estimated coefficient is negative, it does not mean the law necessarily had a beneficial effect. If the law had no effect, the coefficient on the law dummy variable could be negative just by chance. In fact, we would expect it to be negative 50 percent of the time. How do we know when an estimated coefficient is significantly different from zero? Answer: when it is so far from zero that we can conclude beyond a reasonable doubt that it is not zero.

A significance test is used for this. Tests for significance are made up of two hypotheses: the null hypothesis (that the law had no effect or equivalently the coefficient is actually zero) and the alternative hypothesis that the law did have an effect (that the coefficient is truly nonzero). We construct a t-statistic consisting of the estimated coefficient divided by its standard deviation (standard deviations are called “standard errors” in the context of a regression coefficient). The larger the value of the estimated coefficient, the more likely that it is not zero. However, given the standard deviation, we would expect some variation around zero even if the true value is zero (i.e., the null hypothesis is true). If the estimated coefficient is distributed according to the normal distribution (the famous bell curve), which is the usual assumption, then it would be quite unusual for an estimated coefficient to be twice as large as its standard error. How unusual? It would only happen 5% of the time if the true value of the coefficient was zero. Therefore, we reject the null hypothesis that the California acquisition ban had no effect if the t-statistic is greater than two.

The usual standard for significance is the 5 percent level, where there is only a five percent chance of a t-statistic that large if in fact the law had no effect on the

murder rate. This is the statistical equivalent of a “reasonable doubt.” Sometimes researchers use the 10 percent level, which is considered “marginally significant.” I do not use this criterion. Whether the coefficient is significant can be seen by examining the “p-value”, which indicates the probability of rejecting the null hypothesis, given the t-statistic. If the p-value is less than .05 there is a smaller than 5% probability that we could have estimated a coefficient this large if it is truly zero (implying significance). If the t-statistic has a p-value greater than .05, then we cannot reject the null hypothesis that there is no relationship between the explanatory variable and the dependent variable.

Since the data for California from 1977 to 2017 is a time series, we have to consider the possibility that the continuous variables (violent crime rate, murder rate, firearm homicide rate) are so-called “random walks.” If they are random walks, then the regression must be done in first differences:  $Dx(t)=x(t)-x(t-1)$ . There are tests for random walks, called “unit root” tests, the most powerful of which is the DFGLS test, which I used to test whether to use first differences.<sup>4</sup> It turns out that all three of the California crime series are random walks, so I report the results of the regressions in first differences. However, in the Appendix below, I report all the results, including the results of estimating the regressions in levels instead of first differences.<sup>5</sup> Note that the effect of the trend is captured by the constant (intercept) in the first difference regression.

In the following tables, the outcome variable is listed first, then names of the independent variables, the corresponding estimated coefficients, t-statistics, and p-values. For convenience, p-values less than .05 are indicated with an asterisk. For the California acquisition ban to have been successful in saving lives, the coefficient on the variable called “LCM ban” must be negative with a p-value less than .05 (or with an asterisk).<sup>6</sup>

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<sup>4</sup> Graham Elliot, Thomas J. Rothenberg & James H. Stock, *Efficient Tests for an Autoregressive Unit Root*, 64 *Econometrica* 813-836 (July 1996), available at <https://ideas.repec.org/a/ecm/emetrp/v64y1996i4p813-36.html>.

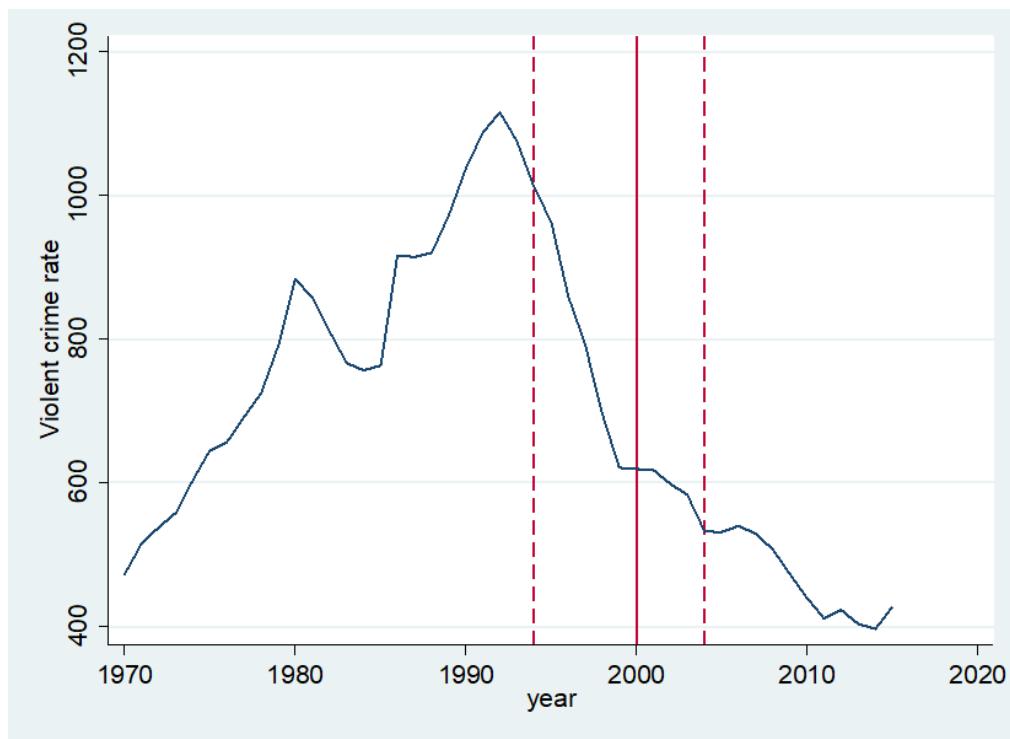
<sup>5</sup> I also test for serial correlation. There is no significant serial correlation in any of my regressions.

<sup>6</sup> For count data like the number of people killed in mass shootings, the number of incidents of mass shootings, and the number of police officers killed in the line of duty, the data is not distributed normally. For these data, I use the negative binomial model, a generalization of the Poisson model. The negative binomial is the standard model for count data.

## 2. California's Violent Crime Rate

The California violent crime rate is shown in Figure 1. The dotted vertical lines correspond to the years of the federal assault weapons ban and corresponding national LCM ban. The single solid vertical line corresponds to the California LCM acquisition ban. If the California acquisition ban successfully reduces violent crime, we should see a discontinuity (also called a “break”) at or after the solid vertical line.

Figure 1: Violent crime rate, California, 1970-2015



Crime was generally rising until 1991, the last year of the crack epidemic, then generally declining. The downturn came before the federal LCM ban, so it is unlikely to have been caused by the national ban. There is no break at or after 2000, the downward trend just continues. We test these observations in Table 1 below. The violent crime rate includes murders and assaults, including gun assaults. If the California acquisition ban has been successful in reducing violent crime, it will have a negative and significant coefficient in Table 1 below.

Table 1: Violent crime rate, California, 1970-2015

| Outcome            | Variable | Coefficient | T-ratio | P-value |
|--------------------|----------|-------------|---------|---------|
| Violent crime rate | LCM ban  | 44.844      | 0.95    | 0.35    |

|                             |         |       |      |
|-----------------------------|---------|-------|------|
| Federal assault weapons ban | -31.547 | -1.00 | 0.32 |
| Percent population 15-29    | 8.984   | 0.43  | 0.67 |
| Crack epidemic 1984-1991    | 2.645   | 0.08  | 0.94 |
| Income per capita           | -1.000  | -0.04 | 0.97 |
| Unemployment rate           | -2.653  | -0.33 | 0.75 |
| Violent crime rate, lagged  | 0.605   | 4.12* | 0.00 |
| Constant                    | -0.345  | -0.04 | 0.97 |

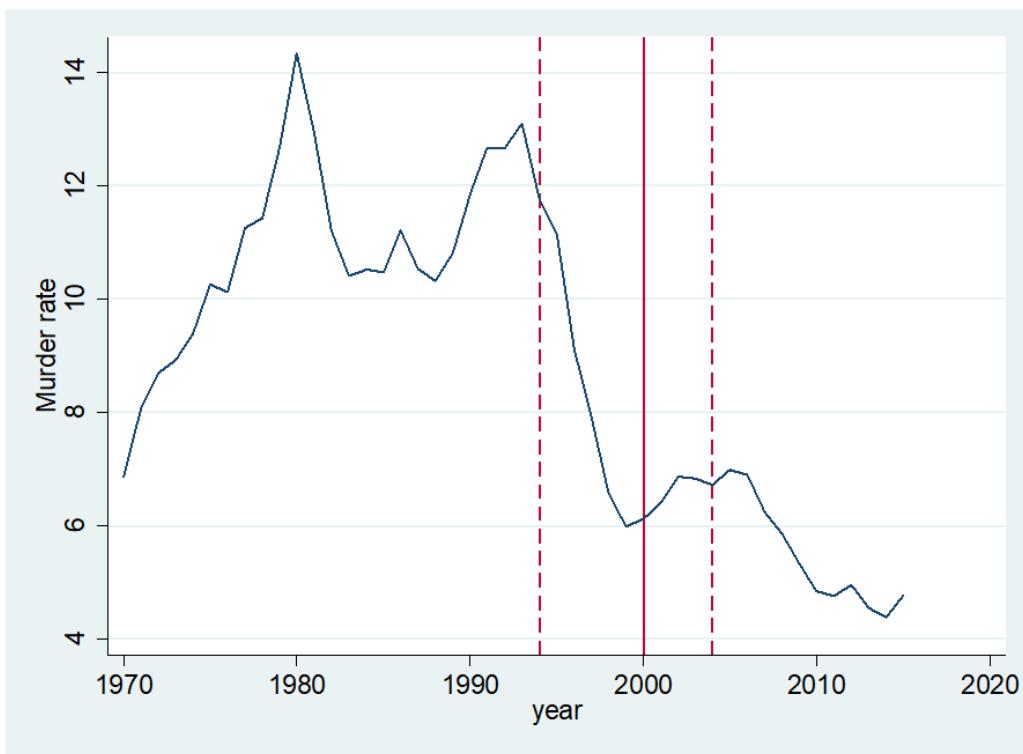
Notes: first differences, trend coefficient estimated by constant; \*  $p < 0.05$

Unfortunately, the coefficient on the California LCM ban dummy is neither negative nor significant. The federal ban dummy is also not significant. Neither the state nor the federal LCM ban had any significant effect on the violent crime rate.

### 3. California's Murder Rate

The murder rate in California for 1970-2015 is shown in Figure 2.

Figure 2: Murder rate, California, 1970-2015



The murder rate also begins to decline in 1991, before the federal LCM ban, it increases from 1999-2005, then generally declines for the next 10 years. The regression model is shown in Table 2 below.

**Table 2:** Murder rate, California, 1970-2015

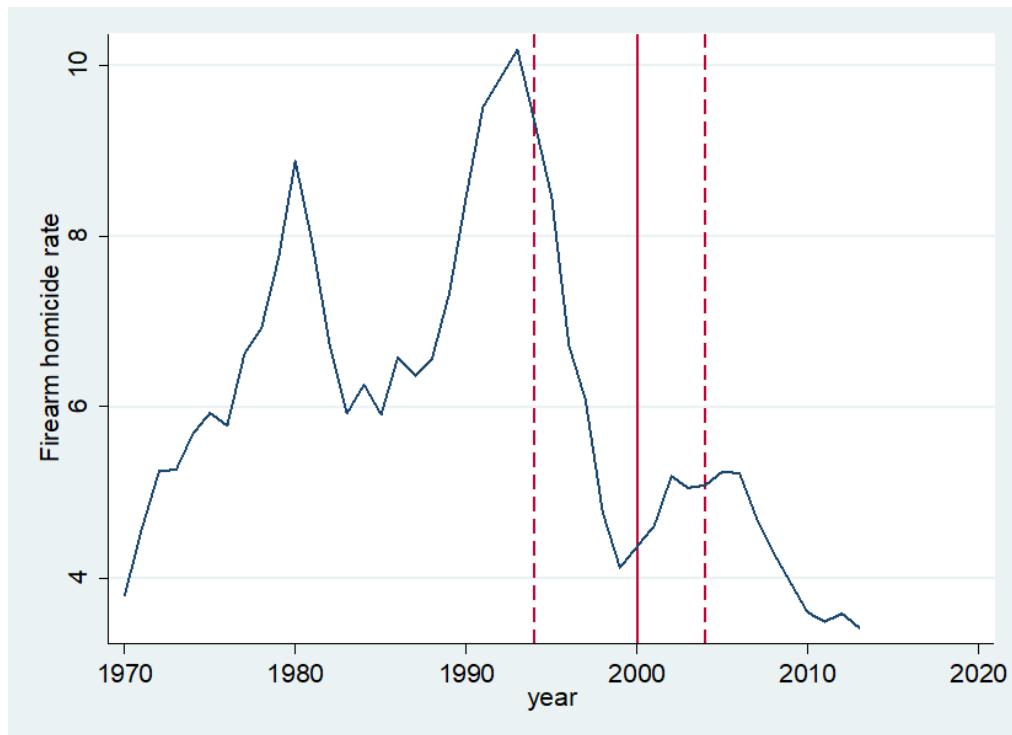
| Outcome     | Variable                    | Coefficient | T-ratio | P-value |
|-------------|-----------------------------|-------------|---------|---------|
| Murder rate | LCM ban                     | 0.586       | 0.73    | 0.47    |
|             | Federal assault weapons ban | -0.884      | -1.61   | 0.12    |
|             | Percent population 15-29    | 0.225       | 0.60    | 0.55    |
|             | Crack epidemic 1984-1991    | 0.360       | 0.61    | 0.54    |
|             | Income per capita           | -0.288      | -0.64   | 0.52    |
|             | Unemployment rate           | -0.056      | -0.39   | 0.70    |
|             | Murder rate, lagged         | 0.452       | 2.97*   | 0.01    |
|             | Constant                    | 0.047       | 0.31    | 0.76    |

Notes: first differences, trend coefficient estimated by constant; \*  $p < 0.05$ .

Again, the coefficient on the LCM ban is neither negative nor significant. The federal ban also had no significant effect.

#### 4. California Firearm Homicide Rate

The firearm homicide rate is more likely to be affected by a LCM ban than the violent crime rate or the overall murder rate. The firearm homicide rate in California for 1970-2015 is shown in Figure 3.

**Figure 3:** Firearm homicide rate, California, 1970-2015

The firearm homicide series follows the general murder rate very closely. As we see below, the results are the same.

Table 3: Firearm homicide rate, California, 1970-2015

| Outcome               | Variable                      | Coefficient | T-ratio | P-value |
|-----------------------|-------------------------------|-------------|---------|---------|
| Firearm homicide rate | LCM ban                       | 0.844       | 1.29    | 0.21    |
|                       | Federal assault weapons ban   | -0.606      | -1.39   | 0.17    |
|                       | Percent population 15-29      | 0.104       | 0.35    | 0.73    |
|                       | Crack epidemic 1984-1991      | 0.472       | 0.99    | 0.33    |
|                       | Income per capita             | -0.355      | -0.92   | 0.37    |
|                       | Unemployment rate             | -0.064      | -0.56   | 0.58    |
|                       | Firearm homicide rate, lagged | 0.545       | 3.64*   | 0.00    |
|                       | Constant                      | 0.056       | 0.46    | 0.65    |

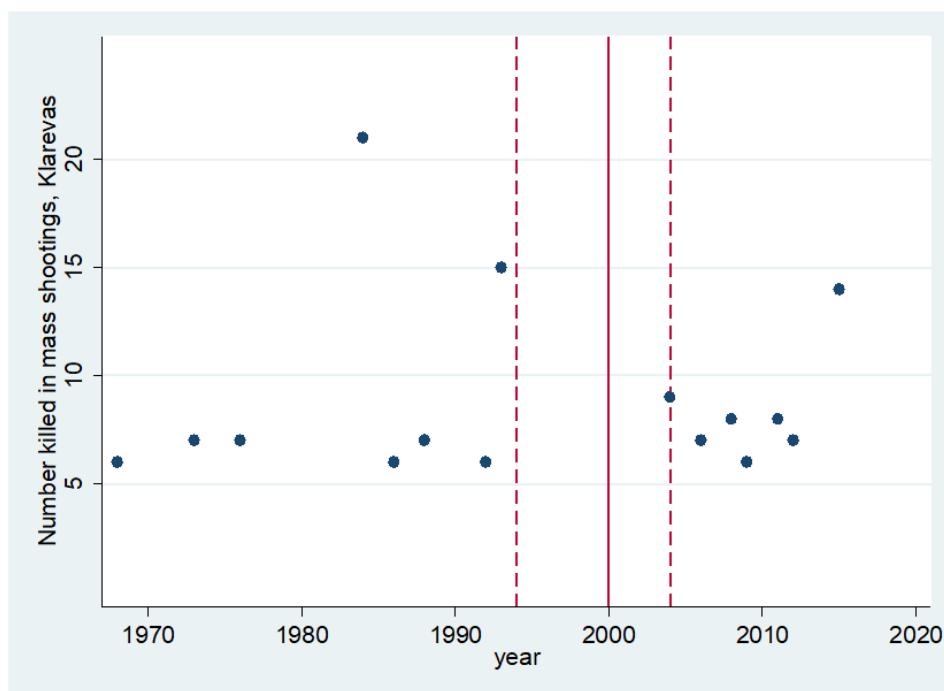
Notes: first differences, trend coefficient estimated by constant; \*  $p<0.05$ .

There is no significant effect of either the state or the federal LCM ban on the gun homicide rate.

## 5. Number of People Killed in California Mass Shootings

The number of deaths due to mass shootings in California from 1968-2015, as pulled from the data presented by Klarevas, is shown in Figure 4.

Figure 4: Deaths due to mass shootings, California, 1968-2015 (Klarevas data)



The regression analysis is reported in Table 4 below.

**Table 4:** Mass shooting deaths, California, 1970-2015

| Outcome              | Variable                 | Coefficient | T-ratio | P-value |
|----------------------|--------------------------|-------------|---------|---------|
| Mass shooting deaths | LCM ban                  | -2.025      | -0.53   | 0.59    |
|                      | Federal LCM ban          | -0.914      | -0.62   | 0.53    |
|                      | Trend                    | -0.701      | -1.60   | 0.11    |
|                      | Percent population 15-29 | -1.046      | -1.41   | 0.16    |
|                      | Crack epidemic 1984-1991 | 3.037       | 1.62    | 0.10    |
|                      | Income per capita        | 3.232       | 1.52    | 0.13    |
|                      | Unemployment rate        | 1.219       | 1.60    | 0.11    |
|                      | Constant                 | -19.890     | -0.78   | 0.43    |

Notes: negative binomial model, income and unemployment data start in 1970, data from Klarevas, \*  $p<0.05$

There is no significant effect of either the federal or the state LCM ban on the number of mass shooting deaths in California.

## 6. Number of Mass Shootings in California

According to Klarevas, between 1968 and 1999 there were 9 incidents of mass shootings in California. Between 2000 and 2015, there were 7 incidents. The regression analysis is presented in Table 5 below.

**Table 5:** Incidents of mass shootings, California, 1970-2015

| Outcome                 | Variable                 | Coefficient | T-ratio | P-value |
|-------------------------|--------------------------|-------------|---------|---------|
| Mass shooting incidents | LCM ban                  | -2.386      | -1.16   | 0.25    |
|                         | Federal LCM ban          | -1.439      | -1.07   | 0.29    |
|                         | Trend                    | -0.235      | -1.18   | 0.24    |
|                         | Percent population 15-29 | -0.380      | -1.16   | 0.25    |
|                         | Crack epidemic 1984-1991 | 0.491       | 0.50    | 0.61    |
|                         | Income per capita        | 1.343       | 1.33    | 0.18    |
|                         | Unemployment rate        | 0.409       | 1.42    | 0.15    |
|                         | Constant                 | -11.043     | -0.82   | 0.41    |

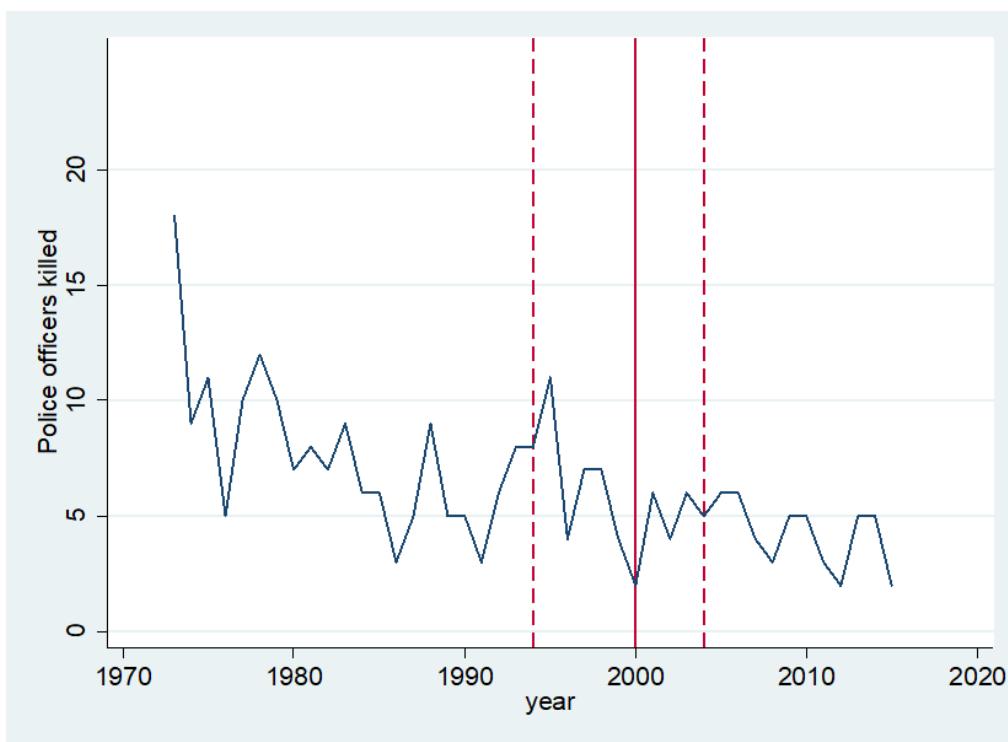
Notes: negative binomial model, income and unemployment data start in 1970, data from Klarevas, \*  $p<0.05$

There is no significant effect of either the federal or the state LCM ban on the number of incidents of mass shootings in California.

## 7. Number of Police Officers Killed in the Line of Duty in California

Koper notes that assault weapons and LCMs are overrepresented in killings of police officers. The implication is that a ban would reduce the number of police officers killed. The data are shown in Figure 5.

Figure 5: Police officers killed in line of duty, California, 1973-2015



The number of officers killed has been declining since 1973. However, the mean before the California LCM ban is 7.5 while the mean after the ban is 4.3. The question is whether this difference is significant. The test is presented in Table 6 below.

Table 6: Police officers killed in the line of duty, California, 1973-2015

| Outcome                | Variable                 | Coefficient | T-ratio | P-value |
|------------------------|--------------------------|-------------|---------|---------|
| Police officers killed | LCM ban                  | 0.056       | 0.14    | 0.89    |
|                        | Federal LCM ban          | -0.232      | -0.89   | 0.37    |
|                        | Trend                    | -0.029      | -0.69   | 0.49    |
|                        | Percent population 15-29 | -0.089      | -1.23   | 0.22    |
|                        | Crack epidemic 1984-1991 | -0.405      | -1.93   | 0.05    |
|                        | Income per capita        | -0.078      | -0.35   | 0.72    |
|                        | Unemployment rate        | -0.033      | -0.48   | 0.63    |

|          |       |      |      |
|----------|-------|------|------|
| Constant | 6.453 | 1.83 | 0.07 |
|----------|-------|------|------|

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Notes: negative binomial model, \*  $p < 0.05$

Neither the state ban nor the national ban had any significant effect on the number of police officers killed in the line of duty in California.

## **8. Summary and Conclusions**

From the statistical analysis of the effects of the state and federal LCM bans presented above, I conclude that the California LCM acquisition ban had no significant effect on violent crime, murder, firearm homicide, the number of people killed in mass shootings, the number of incidents of mass shootings, or the number of police officers killed in the line of duty.

Similarly, I find that the federal assault weapons law and its national LCM ban had no effect on the California violent crime rate, murder rate, gun murder rate, the number of people killed in mass shootings, the number of incidents of mass shootings, or the number of police officers killed in the line of duty.

### **B. Lawfully Possessed (or Grandfathered) Magazines Over Ten Rounds Are Not Commonly Used in Mass Shootings in California, So Banning Possession of Such Magazines Will Not Reduce the Number or Lethality of Such Incidents**

Until the enactment of California Penal Code section 32310(c), the law did not prohibit the possession of LCMs lawfully acquired before January 1, 2000. Therefore, an indeterminate but substantial number of gun owners in California have owned, and continued to own, what I refer to herein as “pre-acquisition-ban” or “grandfathered” LCMs.

Adding a possession ban to California’s current acquisition ban might be expected to save lives if it could be shown that grandfathered, pre-acquisition-ban LCMs are regularly used in mass shootings and can be shown to be responsible for death and injury of Californians. Since magazines over ten rounds in California cannot be legally manufactured, sold, transferred, or imported, the only harm they represent is their use by their lawful owner in criminal shootings.<sup>7</sup>

As an expert witness in another case (*Wiese v. Becerra*, E.D. Cal. No. 2:17-cv-00903-WBS-KJN), I conducted a comprehensive study of California mass

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<sup>7</sup> This argument also requires the assumption that any possession ban would have an appreciable effect on the number of pre-acquisition-ban LCMs used in criminal shootings.

shooting incidents.<sup>8</sup> In doing so, I reviewed the [www.massshootingtracker.com](http://www.massshootingtracker.com) data set, which represents an exhaustive list of mass shooting incidents, as the site defines it.<sup>9</sup> From that data set, I found 185 incidents reported for California between January 1, 2013 and June 5, 2017.<sup>10</sup> Of these 185 cases, only three could be shown to involve the use of LCMs.<sup>11</sup> Between June 5 and October 30, 2017, there were 22 more mass shooting incidents in California as reported by [www.massshootingtracker.com](http://www.massshootingtracker.com).<sup>12</sup>

I also reviewed the mass shooting cases reported in Klarevas's *Rampage Nation*, covering the years 1966-2016,<sup>13</sup> as well as his declaration in this case which includes, in his Appendix B, mass shooting cases for the years 1968-2017.<sup>14</sup> Klarevas conveniently lists the presence of LCMs in those cases. In addition, I have reviewed the cases listed in the *Mother Jones* data set, which spans the years 1982-2017, and the Violence Policy Center mass shooting list.<sup>15</sup>

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<sup>8</sup> Declaration of Carlisle E. Moody in Support of Plaintiffs' Motion for Issuance of a Temporary Restraining Order and Preliminary Injunction at 4, *Weise v. Becerra*, No. 2:17-cv-00903-WBS-KJN (June 10, 2017) ("Moody Declaration").

<sup>9</sup> Massshootingtracker.org defines mass shootings within its database as "a single outburst of violence in which four or more people are shot," including the perpetrator. Mass Shooting Tracker, [www.massshootingtracker.org](http://www.massshootingtracker.org) (last visited Oct. 25, 2017).

<sup>10</sup> Moody Declaration, *supra* note 8, at 5.

<sup>11</sup> *Id.*

<sup>12</sup> Mass Shooting Tracker, <https://massshootingtracker.org/data> (last visited Oct. 30, 2017) ("MST Data").

<sup>13</sup> Louis Klarevas, *Rampage Nation: Securing America from Mass Shootings* 71-86 (2016).

<sup>14</sup> Expert Report of Dr. Louis Klarevas, *Duncan v. Becerra*, No. 3:17-cv-01017-BEN-JLB (Oct. 6, 2017) ("Klarevas Report").

<sup>15</sup> Mother Jones, *US Mass Shootings, 1982-2017: Data from Mother Jones' Investigation*, <http://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data/> (last updated Oct. 18, 2017); Violence Policy Center, *High-Capacity Ammunition Magazines Are the Common Thread Running Through Most Mass Shootings in the United States* (July 1, 2017), available at <http://gunviolence.issuelab.com/resource/high-capacity-ammunition-magazines->

From all these data, I have been presented with an accurate picture of the California mass shooting incidents since the acquisition ban took effect in 2000. I have determined that pre-acquisition-ban LCMs are simply not used in such incidents.

All the California mass shooting incidents involving LCMs since 2000 are discussed below.

### **1. Analysis of [www.massshootingtracker.com](http://www.massshootingtracker.com) Data, 1/1/2013-6/5/2017**

**6/7/13 Santa Monica, CA:** 6 killed including shooter, 4 injured. The perpetrator used a .223 rifle which he assembled from parts. The parts were legally acquired, but the finished rifle was illegal. He was reported to have 40 LCMs with him during the incident. The recent construction of the gun and the age of the shooter (23) indicates that he did not use pre-acquisition-ban LCMs.<sup>16</sup> It is also unlikely that he stored 40 legal LCMs for over 13 years for a rifle that did not exist.

**11/3/13 LAX:** 1 killed, 4 injured including shooter. The perpetrator, armed with what police say was an assault rifle and carrying materials expressing anti-government sentiment, opened fire at Los Angeles International Airport. He killed one person before being chased down himself. He was reported to have used LCMs. However, at 23 he was too young to legally own pre-acquisition-ban LCMs. He was also living out of state before SB 23 was passed.<sup>17</sup>

**12/2/15 San Bernardino, CA:** 16 killed including both shooters, 22 injured. The perpetrators reportedly used LCMs. However, the shooters were children or living outside the country when SB 23 was passed. Also, an accomplice served as a

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[are-the-common-thread-running-through-most-mass-shootings-in-the-united-states.html](http://www.sfgate.com/news/article/What-are-the-common-thread-running-through-most-mass-shootings-in-the-united-states-4831531.php).

<sup>16</sup> Samantha Tata, *Santa Monica shooter Built Illegal Weapon After Govt Denied Him Firearm*, NBC Los Angeles (June 14, 2013)  
<http://www.nbclosangeles.com/news/local/Santa-Monica-Shooting-Police-News-Conference-Watch-Live-211492801.html>

<sup>17</sup> Greg Botelho & Michael Martinez, *FBI: 23-Year-Old L.A. Man Is Suspect in Airport Shooting that Kills TSA Officer*, CNN.com (Nov. 1, 2013),  
[http://www.cnn.com/2013/11/01/us/lax-gunfire/index.html?hpt=hp\\_t1](http://www.cnn.com/2013/11/01/us/lax-gunfire/index.html?hpt=hp_t1).

straw purchaser. The weapons were acquired in 2011 and 2012, long after the passage of SB 23.<sup>18</sup>

Of these three incidents, it is a reasonable inference that these incidents did not involve pre-acquisition-ban magazines given media reports involving: (1) the age of the shooter; (2) the illegal assembly of weapons; and/or (3) the illegal acquisition of weapons generally from out of state. And in these three incidents, the shooter would have ignored or flouted existing California law that already prohibits the manufacture or import of LCMs. It is therefore reasonable to infer that an additional ban on the possession of such firearm parts would not have further deterred or prevented the perpetrator from carrying out the shootings.

## **2. Analysis of [www.massshootingtracker.com](http://www.massshootingtracker.com) Data, 6/6/2017-10/30/2017**

As of October 30, 2017, there have been 22 mass shootings in California since June 5, 2017, according to [www.massshootingtracker.com](http://www.massshootingtracker.com).<sup>19</sup> News reports mention LCMs in only one of these incidents:

**6/14/17 San Francisco, CA:** 4 killed including shooter, 2 injured. A United Parcel Service worker who killed three of his fellow delivery drivers and then himself in San Francisco used a MAC-10-style “assault pistol” with a 30-round magazine that had been stolen in Utah. He also carried a second handgun that had been stolen in Napa, but did not fire it. The shooter also had a black backpack with a box of bullets inside, which was recovered along with the guns.<sup>20</sup> The LCM used in this incident was illegally imported into California. It was not a pre-acquisition-ban LCM.

Of note is an incident from June 6, 2017, that left three dead and one injured in Fresno. There, the 30-year-old victim of a home invasion involving multiple attackers used an AR-15 rifle to defend himself.<sup>21</sup> Although such a weapon can

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<sup>18</sup> Mike McIntire, *Weapons in San Bernardino Shootings Were Legally Obtained*, NY Times (Dec. 3, 2015), <https://www.nytimes.com/2015/12/04/us/weapons-in-san-bernardino-shootings-were-legally-obtained.html>

<sup>19</sup> MST Data, *supra* note 12.

<sup>20</sup> Vivian Ho, *UPS Shooter in San Francisco Used Stolen Gun with 30-round Magazine*, S.F. Gate (June 23, 2017), <http://www.sfgate.com/crime/article/UPS-shooter-in-San-Francisco-used-stolen-gun-with-11243414.php>.

<sup>21</sup> Jim Guy, *Gunfight at East-central Fresno Home Leaves Three Dead, One Wounded*, Fresno Bee (June 6, 2017), [http://www.fresnobee.com/news/local/article\\_154583549.html](http://www.fresnobee.com/news/local/article_154583549.html).

accept an LCM, there is no mention of an LCM in the news reports and the owner would have been too young (13) to have purchased a legal LCM before January 1, 2000.

### **3. Analysis of Remaining Mass Shooting Incidents in California Since 2000**

**1/30/2006 Goleta Postal Shooting, Goleta, CA:** 6 killed. Jennifer San Marco purchased the firearm, a 9 mm Smith & Wesson model 915 handgun equipped with a 15-round magazine, from a pawn shop in Grants, NM in 2005.<sup>22</sup> The magazine was then illegally imported into California. It was not a pre-acquisition-ban magazine.

**12/24/2008 Christmas Party Killings, Covina, CA:** 9 killed. Bruce Jeffrey Pardo, dressed as Santa Clause invaded a Christmas party at his former in-laws' house. He used four, 13-round capacity handguns and a homemade flamethrower. Police found five empty boxes for semiautomatic handguns at his house.<sup>23</sup> The empty boxes indicate that the pistols were probably newly acquired and were therefore not likely to be fitted with pre-acquisition-ban LCMs.

**1/27/2009 Los Angeles, CA:** 6 killed. Ervin Lupoe killed his wife and five children in their home and then killed himself. No LCMs were used.<sup>24</sup>

**3/21/2009 Oakland, CA:** 4 killed. Lovelle Mixon, 26, killed two motorcycle police officers with a semiautomatic handgun after a traffic stop, then fled to his sister's apartment where he had stored a SKS carbine. He killed two police officers with the carbine. Mixon was on parole after serving prison time for armed robbery, thereby in possession of firearms illegally. Although the SKS carbine can accept box magazines of any size, the standard configuration is a 10-round magazine.<sup>25</sup> In any case, Mixon was 16 years old in 1999, making it unlikely that he owned pre-acquisition-ban LCMs.

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<sup>22</sup> Associated Press, *Postal Killer Believed She Was Target of a Plot*, NBCNews.com (Feb. 3, 2006), <http://www.nbcnews.com/id/11167920/#.WfE1fGhSyUk>.

<sup>23</sup> Wikipedia.com, *Covina Massacre* (last updated Oct. 29, 2017), [https://en.wikipedia.org/wiki/Covina\\_massacre](https://en.wikipedia.org/wiki/Covina_massacre).

<sup>24</sup> Klarevas Report, *supra* note 14, App. B at 3.

<sup>25</sup> Wikipedia.com, *SKS* (last updated Oct. 28, 2017), <https://en.wikipedia.org/wiki/SKS>.

**10/12/2011 Seal Beach Shootings, Seal Beach, CA:** 8 killed. Scott Dekraai invaded the Salon Meritage hair salon carrying two semiautomatic pistols and a revolver. No LCMs were used.<sup>26</sup>

**4/2/2012 Oikos University Killings, Oakland, CA:** 7 killed. One L. Goh opened fire on the campus of Oikos University using a semiautomatic handgun and four 10-round magazines. No LCMs were used.<sup>27</sup>

**2/20/2012 Alturas Tribal Shootings, Alturas, CA:** 4 killed. Cherie Rhodes opened fire during an eviction hearing at the Cederville Rancheria tribal headquarters. She was armed with a 9-mm handgun and a knife.<sup>28</sup> No LCMs were used.

**5/23/2014 Isla Vista Mass Murder, Isla Vista/Santa Barbara, CA:** 6 killed. Elliot Rodger, 22, used three handguns, all legally purchased in California, all with 10-round magazines. Another 41 loaded 10-round magazines were found with his body in his car. No LCMs were used.<sup>29</sup>

**4/18/2017 Fresno Downtown Shooting, Fresno, CA:** 3 killed. Kori Ali Muhammad, 39, opened fire walking along a street in downtown Fresno, killing three people randomly in an alleged hate crime prior to being apprehended by police. Over the span of about a minute, Muhammad fired 16 bullets from a .357-caliber revolver over several blocks, killing three white men at random, police said. When he was finally stopped by officers, he acknowledged he was a wanted man.<sup>30</sup> No LCMs were used.

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<sup>26</sup> Klarevas Report, *supra* note 14, App. B at 3.

<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

<sup>29</sup> Sossy Dombourian, Elisha Fieldstadt & Zoya Taylor, *California Gunman Still Had Hundreds of Rounds: Sheriff*, NBC News (May 24, 2014).  
<https://www.nbcnews.com/storyline/isla-vista-rampage/california-gunner-still-had-hundreds-rounds-sheriff-n113961>

<sup>30</sup> Matthew Haag, *Gunman, Thought to Be Targeting Whites, Kills 3 in Fresno, Police Say*, N.Y. Times (April 18, 2017), [https://www.nytimes.com/2017/04/18/us/fresno-shooting-rampage-kori-ali-muhammad.html?\\_r=0](https://www.nytimes.com/2017/04/18/us/fresno-shooting-rampage-kori-ali-muhammad.html?_r=0).

#### **4. Summary and Conclusions**

Thus, after reviewing over 200 mass shooting incidents in California since January 1, 2000, I find that: (1) large capacity magazines were known to be used in only six cases and might have been used in two more; and (2) of the eight cases in which LCMs were, or could have been used, the characteristics of the shooter (age, residence, time of acquisition, etc.) make it extremely unlikely that pre-acquisition-ban LCMs were used in any of these incidents.

In summary, there is no evidence that legally possessed, pre-acquisition-ban LCMs were involved in any mass shooting incident in California since 2000. It is thus my professional opinion that pre-acquisition-ban LCMs present no significant danger to the citizens of California and a possession ban would have no effect other than turning a large number of law-abiding citizens into criminals.

#### **C. The Washington Post Report on LCMs Recovered by Law Enforcement in Virginia Does Not Show that the Federal Ban Had Any Effect on Murders or Gun Homicides**

As Koper's expert report notes, in 2011 the Washington Post published the results of its study of a little-known database on weapons recovered by local law enforcement officers in Virginia.<sup>31</sup> The Criminal Firearms Clearinghouse, maintained by the Virginia State Police, contains detailed information regarding "all firearms seized, forfeited, found or otherwise coming into the possession of any state or local law-enforcement agency of the Commonwealth [of Virginia] which are believed to have been used in the commission of a crime."<sup>32</sup> It includes information on the circumstances of each firearm's recovery and each firearm's physical characteristics, including magazine capacity.

The Washington Post study found that, "[t]he number of guns with high-capacity magazines seized by Virginia police dropped during a decade-long federal prohibition on assault weapons, but the rate has rebounded sharply since the ban

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<sup>31</sup> Expert Report of Dr. S. Christopher Koper at 18-19 & n.22, *Duncan v. Becerra*, No. 3:17-cv-01017-BEN-JLB (Oct. 6, 2017) ("Koper Report"); David S. Fallis & James V. Grimaldi, *Va. Date Show Drop in Criminal Firepower During Assault Gun Ban*, Wash. Post (Jan. 23, 2011), available at <http://www.washingtonpost.com/wp-dyn/content/article/2011/01/22/AR2011012203452.html>.

<sup>32</sup> Virginia State Police, *Firearms Transaction Center (FTC)*, Crim. Jus. Info. Servs. (CJIS) Div. Newsletter 1, July 2013, available at [http://www.vsp.state.va.us/downloads/CJIS\\_Newsletters/CJIS-Newsletter-July-2013.pdf](http://www.vsp.state.va.us/downloads/CJIS_Newsletters/CJIS-Newsletter-July-2013.pdf).

was lifted in late 2004 . . .”<sup>33</sup> This, according to Koper, implies that the federal ban was effective in reducing the number of LCMs used by criminals. “Maybe the federal ban was finally starting to make a dent in the market by the time it ended,” the Washington Post reported Koper as claiming.<sup>34</sup>

Garen Wintemute, head of the Violence Prevention Research Program at the University of California at Davis, was also quoted as saying “[t]he pattern in Virginia ‘may be a pivotal piece of evidence’ that the assault weapons ban eventually had an impact on the proliferation of high-capacity magazines on the streets.” He continued:

“Many people, me included, were skeptical about the chances that the magazine ban would make a difference back in 1994” . . . “But what I am seeing here is that after a few years’ lag time the prevalence of high-capacity magazines was declining. The increase since the ban’s repeal is quite striking.”<sup>35</sup>

Wintemute’s comment about the “striking” increase of LCMs recovered in Virginia since the lapse of the federal ban is somewhat alarming. Did this “striking” increase in LCM use by criminals increase homicide in Virginia? The proportion of recovered firearms in the Criminal Firearms Clearinghouse with magazine capacity greater than 10 is shown in Figure 6 along with the corresponding murder and gun murder rate for Virginia from 1993 to 2013.<sup>36</sup>

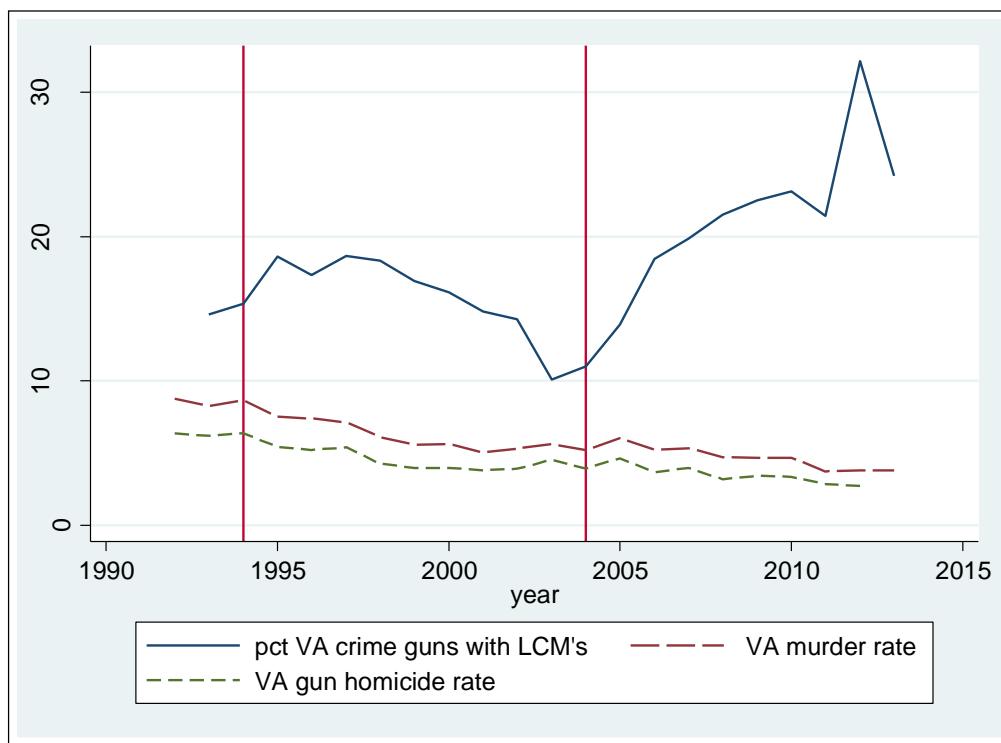
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<sup>33</sup> Fallis, *supra* note 30, at 1.

<sup>34</sup> *Id.*

<sup>35</sup> *Id.*

<sup>36</sup> Murder data is taken from the Uniform Crime Reports. Gun homicide is taken from the CDC Wonder data base.

Figure 6: Proportion of crime guns with LCMs and homicide in Virginia

The proportion of crime guns with LCMs initially rose from 1994-1997, the first three years of the federal ban, then declined steadily to 2004, only to rise again after the ban was lifted. On the other hand, the murder rate and the gun homicide rate in Virginia have both declined steadily, revealing no apparent connection between gun homicides and the use of LCM's by criminals.

This observation can be tested by regressing the Virginia gun homicide rate and overall murder rate on the proportion of crime guns with LCMs and a trend term for 1993-2013. Because the time series could be a random walk, which could lead to a spurious regression, I also used first differences. The results are reported below.

Table 7: Proportion of crime guns with LCMs and homicide in Virginia

| Variable          | Percent<br>LCM |         | Trend  |          | Autocorrelation |         |
|-------------------|----------------|---------|--------|----------|-----------------|---------|
|                   | Coeff          | T-ratio | Coeff  | T-ratio  | Rho             | T-ratio |
| Gun homicide rate | -0.109         | -2.54** |        |          | 0.713           | 5.15*** |
| with trend        | -0.008         | -0.03   | -0.151 | -6.53*** | 0.417           | 1.78*   |

|                       |        |          |        |          |        |         |
|-----------------------|--------|----------|--------|----------|--------|---------|
| First differences     | -0.027 | -0.07    | -0.158 | -1.23    | -0.552 | -2.56** |
| Log gun homicide rate | -0.028 | -3.03*** |        |          | 0.694  | 4.52*** |
| with trend            | -0.006 | -1.03    | -0.033 | -6.86*** | 0.299  | 1.21    |
| First differences     | -0.006 | -0.67    | -0.037 | -1.26    | -0.593 | -2.58** |
| Murder rate           | -0.140 | -2.48**  |        |          | 0.774  | 6.03*** |
| with trend            | -0.021 | -0.67    | -0.217 | -8.49*** | 0.583  | 2.79**  |
| First differences     | -0.004 | -0.12    | -0.221 | -1.83*   | -0.411 | -1.87*  |
| Log murder rate       | -0.027 | -2.91*** |        |          | 0.744  | 4.96*** |
| with trend            | 0.000  | -0.06    | -0.036 | -8.86*** | 0.480  | 2.16**  |
| First differences     | 0.006  | 0.10     | -0.039 | -1.84*   | -0.459 | -2.03*  |
| Gun murders           | -0.021 | -3.03*** |        |          |        |         |
| with trend            | -0.007 | -1.20    | -0.021 | -4.73*** |        |         |
| Murders               | -0.019 | -2.78*** |        |          |        |         |
| with trend            | -0.001 | -0.16    | -0.024 | -6.33*** |        |         |

Notes: \*\*\* significant at .01, \*\* significant at .05, \* significant at .10, two-tailed. Percent LCM is the proportion of Virginia crime guns with LCMs. In the first difference model, the trend is estimated by the intercept. Gun murders and murders are estimated using a negative binomial model. See Appendix 2 for details.

If I omit the trend, the estimated coefficient on the proportion of LCMs is negative and highly significant, reflecting the fact that crime in Virginia continued its decline while the proportion of crime guns with LCMs increased substantially.<sup>37</sup>

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<sup>37</sup> Table 7 also reports the Breusch-Godfrey test for autocorrelation. The regressions in levels show significant positive serial correlation, except for the log of the gun homicide rate, indicating that the t-ratios are likely to be overstated in those cases. In first differences, the serial correlation is negative, indicating that the t-ratios are underestimated. We estimated the regression in both levels and first differences because unit root tests were inconclusive.

However, when I include the trend, which is negative and highly significant, the proportion of LCMs is never significant.

Using a negative binomial model, appropriate for count data, I also regressed the number of gun homicides and murders in Virginia on the LCM proportion and a trend. The results are the same. There is no relationship between the proportion of crime guns with LCMs and either the number of murders or the number of gun homicides. (See Appendix 2 for complete results.)

There is no relationship between the number of public shooting victims and the proportion of LCMs because Virginia had only one such event, the Virginia Tech shooting in 2007, in which the shooter used both standard- and large-capacity magazines holding 10 and 15 rounds.

I conclude that, using data from the Virginia Firearms Clearinghouse, which counts the number of confiscated crime guns with LCMs, I am unable to find any effect of LCMs or the LCM ban on murders or gun homicides. More criminals using more guns with LCMs apparently do not cause more homicides. LCMs appear to have nothing to do with homicide.

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## VIII. APPENDIX AND ATTACHMENT

Attached as **Appendix 1** is a true and correct copy of the complete output of the Stata program used to generate the results reported in Section VI.A. above.

Attached as **Appendix 2** is a true and correct copy of the complete output of the Stata program used to generate the results reported in Section VI.C above.

Attached at **Exhibit 1** and made a part of this report is a copy of my curriculum vitae, including a list of all my published works from the last ten years.

## IX. CONCLUSION

Based on the findings listed above, it is my opinion that the California acquisition ban on LCMs has had no significant effect on the California murder rate, gun homicide rate, the number of people killed in mass shootings, the number of incidents of mass shootings, or the number of police officers killed in the line of duty.

Similarly, I find that the federal assault weapons law and its national LCM ban had no effect on the California violent crime rate, murder rate, gun murder rate, the number of people killed in mass shootings, the number of incidents of mass shootings, or the number of police officers killed in the line of duty.

The ineffectiveness of the acquisition ban is not due to the fact that possession of LCMs was not prohibited. A comprehensive examination of the incidents of mass shootings indicates that no grandfathered, pre-acquisition-ban LCMs have been used in any mass shootings in California.

It is thus my professional opinion that California's acquisition ban has not and will not, even when paired with a possession ban, result in any statistically significant reduction in the number or lethality of mass shooting incidents in California or violent crime rates in general.

Dated: November 30, 2022

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## APPENDIX 1

Complete output of the Stata program used to generate the results reported in Section 3.

```
-----  
-----  
      name: <unnamed>  
      log: C:\Users\cemood\Box Sync\California\report.log  
log type: text  
opened on: 18 Oct 2017, 09:33:51  
  
. *set more off  
. tsset year  
      time variable: year, 1968 to 2017  
              delta: 1 unit  
. gen trend=year-1967  
. gen fedban=(year>1993)*(year<2005)  
. gen pp1529=pp1519+pp2024+pp2529  
(4 missing values generated)  
. gen crack=(year>=1984)*(year<=1991)  
. gen dcrviopc=D.crviope  
(3 missing values generated)  
. gen dcrmurpc=D.crmurpc  
(3 missing values generated)  
. gen dgunhomrate=D.gunhomrate  
(5 missing values generated)  
. gen dlcmban=D.lcmban  
(1 missing value generated)  
. gen dfedban=D.fedban  
(1 missing value generated)  
. gen dpp1529=D.pp1529  
(5 missing values generated)  
. gen drtpipc=D.rtpipc  
(3 missing values generated)  
. gen dunrate=D.unrate  
(5 missing values generated)  
. gen dcrviopc_1=LD.crviope  
(3 missing values generated)  
. gen dcrmurpc_1=LD.crmurpc  
(3 missing values generated)
```

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```
. gen dgunhomrate_1=LD.gunhomrate  
(5 missing values generated)  
  
. gen dcrack=D.crack  
(1 missing value generated)  
  
. .  
. .  
. label var crviopc "Violent crime rate"  
. label var crmurpc "Murder rate"  
. label var gunhomrate "Firearm homicide rate"  
. label var lcmban "LCM ban"  
. label var fedban "Federal LCM ban"  
  
. .  
. label var dcrviopc "Violent crime rate"  
. label var dcrmurpc "Murder rate"  
. label var dgunhomrate "Firearm homicide rate"  
. label var dlcmban "LCM ban"  
. label var dfedban "Federal LCM ban"  
  
. .  
. label var dcrviopc_1 "Violent crime rate, lagged"  
. label var dcrmurpc_1 "Murder rate, lagged"  
. label var dgunhomrate_1 "Firearm homicide rate, lagged"  
. label var crack "Crack epidemic 1984-1991"  
. label var dcrack "Crack epidemic 1984-1991"  
. label var dpp1529 "Percent population 15-29"  
. label var dunrate "Unemployment rate"  
. label var drtpipc "Income per capita"  
. label var pp1529 "Percent population 15-29"  
. label var unratre "Unemployment rate"  
. label var rtpipc "Income per capita"  
. label var trend "Trend"  
. label var polkil "Police officers killed"  
. label var killed "Mass shooting deaths, Klarevas"  
. label var incidents "Mass shooting incidents, Klarevas"  
. .
```

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```
.
. /* violent crime and the LCM ban */
.
. twoway (line crviopc year) if year>1969, xline(1994,lpattern(dash)) xline(2000)
xline(2004,lpattern(dash))

.
. dfgls crviopc
```

DF-GLS for crviopc Number of obs = 38  
 Maxlag = 9 chosen by Schwert criterion

| [lags] | DF-GLS tau<br>Test Statistic | 1% Critical<br>Value | 5% Critical<br>Value | 10% Critical<br>Value |
|--------|------------------------------|----------------------|----------------------|-----------------------|
| 9      | -1.402                       | -3.770               | -2.723               | -2.425                |
| 8      | -1.022                       | -3.770               | -2.783               | -2.490                |
| 7      | -1.045                       | -3.770               | -2.850               | -2.559                |
| 6      | -1.581                       | -3.770               | -2.921               | -2.630                |
| 5      | -1.375                       | -3.770               | -2.994               | -2.701                |
| 4      | -1.189                       | -3.770               | -3.066               | -2.769                |
| 3      | -1.239                       | -3.770               | -3.133               | -2.833                |
| 2      | -1.224                       | -3.770               | -3.195               | -2.889                |
| 1      | -1.171                       | -3.770               | -3.247               | -2.937                |

Opt Lag (Ng-Perron seq t) = 9 with RMSE 36.79024  
 Min SC = 7.686171 at lag 1 with RMSE 42.40895  
 Min MAIC = 7.625905 at lag 1 with RMSE 42.40895

. regress dcrviopc dlcmban dfedban dpp1529 dcrack drtpipc dunrate dcrviopc\_1

| Source   | SS         | df | MS         | Number of obs | = | 45     |
|----------|------------|----|------------|---------------|---|--------|
|          |            |    |            | F(7, 37)      | = | 2.89   |
| Model    | 37953.3085 | 7  | 5421.90122 | Prob > F      | = | 0.0163 |
| Residual | 69380.1786 | 37 | 1875.13996 | R-squared     | = | 0.3536 |
| Total    | 107333.487 | 44 | 2439.39744 | Adj R-squared | = | 0.2313 |
|          |            |    |            | Root MSE      | = | 43.303 |

| dcrviopc   | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|------------|-----------|-----------|-------|-------|----------------------|
| dlcmban    | 44.84434  | 46.96038  | 0.95  | 0.346 | -50.30644 139.9951   |
| dfedban    | -31.54718 | 31.61965  | -1.00 | 0.325 | -95.61467 32.52031   |
| dpp1529    | 8.983775  | 21.06671  | 0.43  | 0.672 | -33.70144 51.66899   |
| dcrack     | 2.645099  | 33.32475  | 0.08  | 0.937 | -64.87727 70.16747   |
| drtpipc    | -.999542  | 25.79697  | -0.04 | 0.969 | -53.26916 51.27008   |
| dunrate    | -2.65343  | 8.150656  | -0.33 | 0.747 | -19.16823 13.86137   |
| dcrviopc_1 | .6052954  | .146779   | 4.12  | 0.000 | .3078928 .9026979    |
| _cons      | -.3448009 | 8.790083  | -0.04 | 0.969 | -18.1552 17.4656     |

. outreg using table1, starlevels(5) ctitles(Variable,Coefficient, T-ratio, P-value)  
 varlabels replace stats(b t p) nosubstat

| Variable                 | Coefficient | T-ratio | P-value |
|--------------------------|-------------|---------|---------|
| LCM ban                  | 44.844      | 0.95    | 0.35    |
| Federal LCM ban          | -31.547     | -1.00   | 0.32    |
| Percent population 15-29 | 8.984       | 0.43    | 0.67    |
| Crack epidemic 1984-1991 | 2.645       | 0.08    | 0.94    |

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|                            |        |       |      |
|----------------------------|--------|-------|------|
| Income per capita          | -1.000 | -0.04 | 0.97 |
| Unemployment rate          | -2.653 | -0.33 | 0.75 |
| Violent crime rate, lagged | 0.605  | 4.12* | 0.00 |
| Constant                   | -0.345 | -0.04 | 0.97 |

\* p<0.05

. test dpp1529 dcrack drtpipc dunrate

```
( 1) dpp1529 = 0
( 2) dcrack = 0
( 3) drtpipc = 0
( 4) dunrate = 0

F(  4,     37) =     0.11
                 Prob > F =    0.9790
```

. regress dcrviopc dlcmban dfedban dcrviopc\_1

| Source   | SS         | df | MS         | Number of obs | = | 46     |
|----------|------------|----|------------|---------------|---|--------|
| Model    | 37434.0285 | 3  | 12478.0095 | F(3, 42)      | = | 7.46   |
| Residual | 70204.9891 | 42 | 1671.54736 | Prob > F      | = | 0.0004 |
|          |            |    |            | R-squared     | = | 0.3478 |
|          |            |    |            | Adj R-squared | = | 0.3012 |
| Total    | 107639.018 | 45 | 2391.97817 | Root MSE      | = | 40.885 |

| dcrviopc   | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|------------|-----------|-----------|-------|-------|----------------------|
| dlcmban    | 45.16038  | 42.50885  | 1.06  | 0.294 | -40.62595 130.9467   |
| dfedban    | -34.9102  | 28.91836  | -1.21 | 0.234 | -93.26981 23.44942   |
| dcrviopc_1 | .5888778  | .1279103  | 4.60  | 0.000 | .3307443 .8470113    |
| _cons      | -1.334702 | 6.09661   | -0.22 | 0.828 | -13.63816 10.96875   |

. estat bgodfrey, lags(1) small

Breusch-Godfrey LM test for autocorrelation

| lags(p) | F     | df           | Prob > F |
|---------|-------|--------------|----------|
| 1       | 0.718 | ( 1,    41 ) | 0.4016   |

H0: no serial correlation

```
. *twoway (line dcrviopc year) if year>1969, xline(1994,lpattern(dash)) xline(2000)
xline(2004,lpattern(dash))
. more
```

. /\* murder \*/

```
. twoway (line crmurpc year) if year>1969, xline(1994,lpattern(dash)) xline(2000)
xline(2004,lpattern(dash))
```

. dfgls crmurpc

```
DF-GLS for crmurpc                                         Number of obs =      38
Maxlag = 9 chosen by Schwert criterion
```

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| [lags] | DF-GLS tau<br>Test Statistic | 1% Critical<br>Value | 5% Critical<br>Value | 10% Critical<br>Value |
|--------|------------------------------|----------------------|----------------------|-----------------------|
| 9      | -1.014                       | -3.770               | -2.723               | -2.425                |
| 8      | -0.786                       | -3.770               | -2.783               | -2.490                |
| 7      | -0.968                       | -3.770               | -2.850               | -2.559                |
| 6      | -1.172                       | -3.770               | -2.921               | -2.630                |
| 5      | -1.317                       | -3.770               | -2.994               | -2.701                |
| 4      | -1.334                       | -3.770               | -3.066               | -2.769                |
| 3      | -1.410                       | -3.770               | -3.133               | -2.833                |
| 2      | -1.671                       | -3.770               | -3.195               | -2.889                |
| 1      | -1.707                       | -3.770               | -3.247               | -2.937                |

Opt Lag (Ng-Perron seq t) = 1 with RMSE .686063  
Min SC = -.5621197 at lag 1 with RMSE .686063  
Min MAIC = -.5328976 at lag 1 with RMSE .686063

. regress dcrmurpc dlcmban dfedban dpp1529 dcrack drtpipc dunrate dcrmurpc\_1

| Source   | SS         | df | MS         | Number of obs | = | 45     |
|----------|------------|----|------------|---------------|---|--------|
| Model    | 8.14377879 | 7  | 1.16339697 | F(7, 37)      | = | 2.07   |
| Residual | 20.8393118 | 37 | .563224644 | Prob > F      | = | 0.0723 |
| Total    | 28.9830906 | 44 | .658706605 | R-squared     | = | 0.2810 |
|          |            |    |            | Adj R-squared | = | 0.1450 |
|          |            |    |            | Root MSE      | = | .75048 |

| dcrmurpc   | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|------------|-----------|-----------|-------|-------|----------------------|
| dlcmban    | .5863887  | .8065601  | 0.73  | 0.472 | -1.047857 2.220635   |
| dfedban    | -.8840157 | .5505488  | -1.61 | 0.117 | -1.999534 .2315022   |
| dpp1529    | .2253544  | .3744847  | 0.60  | 0.551 | -.5334237 .9841324   |
| dcrack     | .3602601  | .586199   | 0.61  | 0.543 | -.8274918 1.548012   |
| drtpipc    | -.2878104 | .4464038  | -0.64 | 0.523 | -1.19231 .6166895    |
| dunrate    | -.0560486 | .1434289  | -0.39 | 0.698 | -.3466631 .234566    |
| dcrmurpc_1 | .4516491  | .152137   | 2.97  | 0.005 | .1433902 .759908     |
| _cons      | .0467065  | .1517945  | 0.31  | 0.760 | -.2608583 .3542713   |

. outreg using table2 , starlevels(5) ctitles(Variable,Coefficient, T-ratio, P-value)  
varlabels replace stats(b t p) nosubstat

| Variable                 | Coefficient | T-ratio | P-value |
|--------------------------|-------------|---------|---------|
| LCM ban                  | 0.586       | 0.73    | 0.47    |
| Federal LCM ban          | -0.884      | -1.61   | 0.12    |
| Percent population 15-29 | 0.225       | 0.60    | 0.55    |
| Crack epidemic 1984-1991 | 0.360       | 0.61    | 0.54    |
| Income per capita        | -0.288      | -0.64   | 0.52    |
| Unemployment rate        | -0.056      | -0.39   | 0.70    |
| Murder rate, lagged      | 0.452       | 2.97*   | 0.01    |
| Constant                 | 0.047       | 0.31    | 0.76    |

\* p<0.05

. predict e, resid  
(5 missing values generated)

. estat bgodfrey, lags(1) small

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Breusch-Godfrey LM test for autocorrelation

| lags(p) | F     | df        | Prob > F |
|---------|-------|-----------|----------|
| 1       | 0.004 | ( 1, 36 ) | 0.9515   |

H0: no serial correlation

. more

```
.
. /* gun homicide rate */
.
. twoway (line gunhomrate year) if year>1969, xline(1994,lpattern(dash)) xline(2000)
xline(2004,lpattern(dash))

. dfgls gunhomrate
```

DF-GLS for gunhomrate Number of obs = 36  
Maxlag = 9 chosen by Schwert criterion

| [lags] | DF-GLS tau     | 1% Critical Value | 5% Critical Value | 10% Critical Value |
|--------|----------------|-------------------|-------------------|--------------------|
|        | Test Statistic |                   |                   |                    |
| 9      | -0.875         | -3.770            | -2.716            | -2.412             |
| 8      | -0.697         | -3.770            | -2.775            | -2.477             |
| 7      | -0.957         | -3.770            | -2.843            | -2.549             |
| 6      | -1.083         | -3.770            | -2.917            | -2.623             |
| 5      | -1.254         | -3.770            | -2.994            | -2.698             |
| 4      | -1.425         | -3.770            | -3.070            | -2.771             |
| 3      | -1.600         | -3.770            | -3.142            | -2.840             |
| 2      | -2.155         | -3.770            | -3.208            | -2.901             |
| 1      | -1.931         | -3.770            | -3.264            | -2.952             |

Opt Lag (Ng-Perron seq t) = 1 with RMSE .5520979  
Min SC = -.9889755 at lag 1 with RMSE .5520979  
Min MAIC = -.9030688 at lag 1 with RMSE .5520979

. regress dgunhomrate dlcmban dfedban dpp1529 dcrack drtpipc dunrate dgunhomrate\_1

| Source   | SS         | df | MS         | Number of obs | = | 43     |
|----------|------------|----|------------|---------------|---|--------|
| Model    | 6.75439422 | 7  | .96491346  | F(7, 35)      | = | 2.70   |
| Residual | 12.5292156 | 35 | .357977588 | Prob > F      | = | 0.0241 |
| Total    | 19.2836098 | 42 | .459133567 | R-squared     | = | 0.3503 |
|          |            |    |            | Adj R-squared | = | 0.2203 |
|          |            |    |            | Root MSE      | = | .59831 |

| dgunhomrate   | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|---------------|-----------|-----------|-------|-------|----------------------|
| dlcmban       | .8436859  | .6538369  | 1.29  | 0.205 | -.4836736 2.171045   |
| dfedban       | -.6063146 | .437159   | -1.39 | 0.174 | -1.493795 .2811653   |
| dpp1529       | .1036157  | .2944184  | 0.35  | 0.727 | -.4940854 .7013167   |
| dcrack        | .4721783  | .4757592  | 0.99  | 0.328 | -.4936642 1.438021   |
| drtpipc       | -.3549564 | .3873536  | -0.92 | 0.366 | -1.141326 .4314131   |
| dunrate       | -.0643103 | .1157443  | -0.56 | 0.582 | -.2992837 .1706632   |
| dgunhomrate_1 | .5453604  | .1500127  | 3.64  | 0.001 | .2408184 .8499024    |
| _cons         | .0556823  | .1222048  | 0.46  | 0.651 | -.1924066 .3037712   |

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```
. outreg using table3 , starlevels(5) ctitles(Variable,Coefficient, T-ratio, P-value)
varlabels replace stats(b t p) nosubstat
```

| Variable                      | Coefficient | T-ratio | P-value |
|-------------------------------|-------------|---------|---------|
| LCM ban                       | 0.844       | 1.29    | 0.21    |
| Federal LCM ban               | -0.606      | -1.39   | 0.17    |
| Percent population 15-29      | 0.104       | 0.35    | 0.73    |
| Crack epidemic 1984-1991      | 0.472       | 0.99    | 0.33    |
| Income per capita             | -0.355      | -0.92   | 0.37    |
| Unemployment rate             | -0.064      | -0.56   | 0.58    |
| Firearm homicide rate, lagged | 0.545       | 3.64*   | 0.00    |
| Constant                      | 0.056       | 0.46    | 0.65    |

\* p<0.05

```
. estat bgodfrey, lags(2) small
```

Breusch-Godfrey LM test for autocorrelation

| lags(p) | F     | df        | Prob > F |
|---------|-------|-----------|----------|
| 2       | 0.829 | ( 2, 33 ) | 0.4452   |

H0: no serial correlation

```
. *twoway (line gunhomrate year) if yhat =~., xline(1994) xline(2000) xline(2004)
```

```
. more
```

```
. /* number killed in mass public shootings Klarevas data */
```

```
. gen kkilled=killed
```

```
. replace kkilled=. if killed==0
(35 real changes made, 35 to missing)
```

```
. label var kkilled "Number killed in mass shootings, Klarevas"
```

```
. twoway (scatter kkilled year) if year>1967, ysc(r(0 25)) xline(1994,lpattern(dash))
xline(2000) xline(2004,lpattern(dash))
```

```
. nbreg killed lcmban fedban trend pp1529 crack rtpipc unrate, nolog
```

|                              |               |   |        |
|------------------------------|---------------|---|--------|
| Negative binomial regression | Number of obs | = | 46     |
|                              | LR chi2(7)    | = | 7.35   |
| Dispersion = mean            | Prob > chi2   | = | 0.3932 |
| Log likelihood = -74.530257  | Pseudo R2     | = | 0.0470 |

| killed | Coef.     | Std. Err. | z     | P> z  | [95% Conf. Interval] |
|--------|-----------|-----------|-------|-------|----------------------|
| lcmban | -2.025035 | 3.791376  | -0.53 | 0.593 | -9.455996 5.405925   |
| fedban | -.9139186 | 1.468685  | -0.62 | 0.534 | -3.792489 1.964652   |
| trend  | -.7012929 | .4384203  | -1.60 | 0.110 | -1.560581 .157995    |
| pp1529 | -1.045867 | .7400789  | -1.41 | 0.158 | -2.496395 .404661    |
| crack  | 3.036672  | 1.870139  | 1.62  | 0.104 | -.628732 6.702076    |
| rtpipc | 3.231676  | 2.1214    | 1.52  | 0.128 | -.9261921 7.389545   |

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```

unrate | 1.218783 .7615005 1.60 0.109 -.273731 2.711296
       _cons | -19.88964 25.47565 -0.78 0.435 -69.82099 30.04172
-----
       +-----+
       /lnalpha | 1.717326 .3556229 1.020318 2.414334
       +-----+
       alpha | 5.569614 1.980682 2.774076 11.18232
       +-----+
LR test of alpha=0: chibar2(01) = 159.74 Prob >= chibar2 = 0.000
.
. ***** note: Poisson rejected by likelihood ratio test on alpha *****/
.
. outreg using table4 , starlevels(5) ctitles(Outcome,Variable,Coefficient, T-ratio, P-value) varlabels replace stats(b t p) nosubstat
.
-----+
      Outcome          Variable          Coefficient   T-ratio   P-value
-----+
Mass shooting deaths, Klarevas LCM ban      -2.025     -0.53    0.59
      Federal LCM ban      -0.914     -0.62    0.53
      Trend      -0.701     -1.60    0.11
      Percent population 15-29      -1.046     -1.41    0.16
      Crack epidemic 1984-1991      3.037      1.62    0.10
      Income per capita      3.232      1.52    0.13
      Unemployment rate      1.219      1.60    0.11
      Constant      -19.890     -0.78    0.43
lnalpha           Constant      1.717      4.83*   0.00
-----+
* p<0.05

.
. more
.
.
. /* number of incidents of mass murder, Klarevas data */
.
. gen x=incidents
.
. replace x=. if x==0
(35 real changes made, 35 to missing)
.
. label var x "Number of incidents of mass shootings, Klarevas"
.
. twoway (scatter x year), xline(1994,lpattern(dash)) xline(2000) xline(2004,lpattern(dash))
.
. nbreg incidents lcmban fedban trend pp1529 crack rtpipc unrate, nolog
.
Negative binomial regression
Number of obs      =        46
LR chi2(7)        =      8.53
Dispersion      = mean
Prob > chi2       =    0.2881
Log likelihood   = -28.2365
Pseudo R2         =    0.1312
.
-----+
      incidents |      Coef.   Std. Err.      z   P>|z| [95% Conf. Interval]
-----+
      lcmban | -2.385524 2.061694 -1.16 0.247 -6.42637 1.655323
      fedban | -1.439191 1.348343 -1.07 0.286 -4.081894 1.203512
      trend | -.2348308 .1984285 -1.18 0.237 -.6237436 .154082
      pp1529 | -.379523 .3268173 -1.16 0.246 -1.020073 .2610272

```

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```

crack | .4911215   .9752547   0.50   0.615   -1.420343   2.402586
rtpipc | 1.3435    1.007087   1.33   0.182   -.6303553   3.317355
unrate | .4089753   .2875448   1.42   0.155   -.154602   .9725527
_cons | -11.04284  13.46766  -0.82   0.412   -37.43896  15.35328
-----+
/lnalpha | -35.09767   .
-----+
alpha | 5.72e-16   .
-----+
LR test of alpha=0: chibar2(01) = 0.00          Prob >= chibar2 = 1.000

. outreg using table5 , starlevels(5) ctitles(Outcome,Variable,Coefficient, T-ratio, P-value) varlabels replace stats(b t p) nosubstat

-----+


| Outcome                                   | Variable | Coefficient | T-ratio | P-value |
|-------------------------------------------|----------|-------------|---------|---------|
| Mass shooting incidents, Klarevas LCM ban |          | -2.386      | -1.16   | 0.25    |
| Federal LCM ban                           |          | -1.439      | -1.07   | 0.29    |
| Trend                                     |          | -0.235      | -1.18   | 0.24    |
| Percent population 15-29                  |          | -0.380      | -1.16   | 0.25    |
| Crack epidemic 1984-1991                  |          | 0.491       | 0.50    | 0.61    |
| Income per capita                         |          | 1.343       | 1.33    | 0.18    |
| Unemployment rate                         |          | 0.409       | 1.42    | 0.15    |
| Constant                                  |          | -11.043     | -0.82   | 0.41    |
| lnalpha                                   | Constant |             | -35.098 |         |


-----+
* p<0.05

. poisson incidents lcmban fedban trend pp1529 crack rtpipc unrate, nolog

Poisson regression
Number of obs      =        46
LR chi2(7)        =       8.53
Prob > chi2       =     0.2881
Pseudo R2         =     0.1312
Log likelihood = -28.2365

-----+


| incidents | Coef.     | Std. Err. | z     | P> z  | [95% Conf. Interval] |
|-----------|-----------|-----------|-------|-------|----------------------|
| lcmban    | -2.385524 | 2.061694  | -1.16 | 0.247 | -6.42637 1.655323    |
| fedban    | -1.439191 | 1.348343  | -1.07 | 0.286 | -4.081894 1.203512   |
| trend     | -.2348308 | .1984286  | -1.18 | 0.237 | -.6237436 .154082    |
| pp1529    | -.379523  | .3268173  | -1.16 | 0.246 | -1.020073 .2610272   |
| crack     | .4911215  | .9752547  | 0.50  | 0.615 | -1.420343 2.402586   |
| rtpipc    | 1.3435    | 1.007087  | 1.33  | 0.182 | -.6303553 3.317355   |
| unrate    | .4089753  | .2875448  | 1.42  | 0.155 | -.154602 .9725527    |
| _cons     | -11.04284 | 13.46766  | -0.82 | 0.412 | -37.43896 15.35328   |


-----+
. more

. /* police officers killed in line of duty */
. drop x

. nbreg polkil lcmban fedban trend pp1529 crack rtpipc unrate, nolog

Negative binomial regression
Number of obs      =        43
LR chi2(6)        =      31.87
Dispersion = mean
Prob > chi2       =     0.0000

```

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Log likelihood = -89.637301 Pseudo R2 = 0.1510

| polkil   | Coef.     | Std. Err. | z     | P> z  | [95% Conf. Interval] |
|----------|-----------|-----------|-------|-------|----------------------|
| lcmban   | .056078   | .4088831  | 0.14  | 0.891 | -.7453181 .8574741   |
| fedban   | -.2321364 | .2598886  | -0.89 | 0.372 | -.7415086 .2772359   |
| trend    | -.0290026 | .0421929  | -0.69 | 0.492 | -.1116993 .053694    |
| pp1529   | -.0893957 | .0726395  | -1.23 | 0.218 | -.2317665 .052975    |
| crack    | -.4051925 | .2096658  | -1.93 | 0.053 | -.81613 .005745      |
| rtpipc   | -.0784565 | .2221189  | -0.35 | 0.724 | -.5138015 .3568885   |
| unrate   | -.0327168 | .0676716  | -0.48 | 0.629 | -.1653507 .0999171   |
| _cons    | 6.453041  | 3.518096  | 1.83  | 0.067 | -.4423013 13.34838   |
| /lnalpha | -34.79069 | .         | .     | .     | .                    |
| alpha    | 7.77e-16  | .         | .     | .     | .                    |

LR test of alpha=0: chibar2(01) = 0.00 Prob >= chibar2 = 1.000

. outreg using table6 , starlevels(5) ctitles(Outcome,Variable,Coefficient, T-ratio, P-value) varlabels replace stats(b t p) nosubstat

| Outcome                  | Variable | Coefficient | T-ratio | P-value |
|--------------------------|----------|-------------|---------|---------|
| Police officers killed   | LCM ban  | 0.056       | 0.14    | 0.89    |
| Federal LCM ban          |          | -0.232      | -0.89   | 0.37    |
| Trend                    |          | -0.029      | -0.69   | 0.49    |
| Percent population 15-29 |          | -0.089      | -1.23   | 0.22    |
| Crack epidemic 1984-1991 |          | -0.405      | -1.93   | 0.05    |
| Income per capita        |          | -0.078      | -0.35   | 0.72    |
| Unemployment rate        |          | -0.033      | -0.48   | 0.63    |
| Constant                 |          | 6.453       | 1.83    | 0.07    |
| lnalpha                  | Constant |             |         | -34.791 |

\* p<0.05

. test pp1529 rtpipc unrate

( 1) [polkil]pp1529 = 0  
 ( 2) [polkil]rtpipc = 0  
 ( 3) [polkil]unrate = 0

chi2( 3) = 2.08  
 Prob > chi2 = 0.5569

. poisson polkil lcmban fedban trend pp1529 crack rtpipc unrate, nolog

Poisson regression Number of obs = 43  
 LR chi2(7) = 35.30  
 Prob > chi2 = 0.0000  
 Log likelihood = -89.637301 Pseudo R2 = 0.1645

| polkil | Coef.     | Std. Err. | z     | P> z  | [95% Conf. Interval] |
|--------|-----------|-----------|-------|-------|----------------------|
| lcmban | .0560784  | .4088831  | 0.14  | 0.891 | -.7453177 .8574745   |
| fedban | -.2321364 | .2598886  | -0.89 | 0.372 | -.7415086 .2772359   |
| trend  | -.0290025 | .0421929  | -0.69 | 0.492 | -.1116991 .0536941   |

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|        |           |          |       |       |           |          |
|--------|-----------|----------|-------|-------|-----------|----------|
| pp1529 | -.0893956 | .0726395 | -1.23 | 0.218 | -.2317664 | .0529752 |
| crack  | -.4051925 | .2096658 | -1.93 | 0.053 | -.81613   | .005745  |
| rtpipc | -.078457  | .2221189 | -0.35 | 0.724 | -.5138019 | .356888  |
| unrate | -.0327168 | .0676716 | -0.48 | 0.629 | -.1653507 | .099917  |
| _cons  | 6.453043  | 3.518097 | 1.83  | 0.067 | -.4423001 | 13.34839 |

```
. gen x=polkil if polkil~=0
(7 missing values generated)

. label var x "Police officers killed"

. twoway (line x year) if year>1972, ysc(r(0 25)) xline(1994,lpattern(dash)) xline(2000)
xline(2004,lpattern(dash))

. mean polkil if year<=1999
```

Mean estimation Number of obs = 27

|        | Mean     | Std. Err. | [95% Conf. Interval] |
|--------|----------|-----------|----------------------|
| polkil | 7.518519 | .6233134  | 6.23728 8.799758     |

```
. mean polkil if year>1999
```

Mean estimation Number of obs = 16

|        | Mean   | Std. Err. | [95% Conf. Interval] |
|--------|--------|-----------|----------------------|
| polkil | 4.3125 | .3732599  | 3.516915 5.108085    |

```
. /* regressions in levels instead of first differences */
```

```
. regress crviopc lcmban fedban pp1529 crack rtpipc unrate L.crviopc
```

| Source   | SS         | df | MS         | Number of obs | = | 46     |
|----------|------------|----|------------|---------------|---|--------|
| Model    | 1911311.24 | 7  | 273044.462 | F(7, 38)      | = | 216.16 |
| Residual | 48000.0767 | 38 | 1263.15991 | Prob > F      | = | 0.0000 |
| Total    | 1959311.31 | 45 | 43540.2514 | R-squared     | = | 0.9755 |
|          |            |    |            | Adj R-squared | = | 0.9710 |
|          |            |    |            | Root MSE      | = | 35.541 |

| crviopc | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|---------|-----------|-----------|-------|-------|----------------------|
| lcmban  | 52.97421  | 33.32976  | 1.59  | 0.120 | -14.49837 120.4468   |
| fedban  | -52.17283 | 19.85951  | -2.63 | 0.012 | -92.37631 -11.96935  |
| pp1529  | 2.42715   | 4.805705  | 0.51  | 0.616 | -7.301492 12.15579   |
| crack   | 33.79697  | 18.29422  | 1.85  | 0.072 | -3.237745 70.83169   |
| rtpipc  | -10.19981 | 6.295427  | -1.62 | 0.113 | -22.94424 2.544612   |
| unrate  | -8.285666 | 3.407783  | -2.43 | 0.020 | -15.18436 -1.38697   |
| crviopc |           |           |       |       |                      |
| L1.     | .9796338  | .0422401  | 23.19 | 0.000 | .8941232 1.065144    |
| _cons   | 178.0654  | 210.7171  | 0.85  | 0.403 | -248.509 604.6398    |

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```
. estat bgodfrey, lags(1) small
```

Breusch-Godfrey LM test for autocorrelation

| lags(p) | F     | df        | Prob > F |
|---------|-------|-----------|----------|
| 1       | 0.326 | ( 1, 37 ) | 0.5713   |

H0: no serial correlation

```
. regress crmurpc lcmban fedban pp1529 crack rtpipc unrate L.crmurpc
```

| Source   | SS         | df | MS         | Number of obs | = | 46     |
|----------|------------|----|------------|---------------|---|--------|
| Model    | 340.195397 | 7  | 48.5993424 | F(7, 38)      | = | 98.40  |
| Residual | 18.7677972 | 38 | .493889399 | Prob > F      | = | 0.0000 |
| Total    | 358.963194 | 45 | 7.97695987 | R-squared     | = | 0.9477 |
|          |            |    |            | Adj R-squared | = | 0.9381 |
|          |            |    |            | Root MSE      | = | .70277 |

| crmurpc | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|---------|-----------|-----------|-------|-------|----------------------|
| lcmban  | 1.005674  | .6305389  | 1.59  | 0.119 | -.2707855 2.282133   |
| fedban  | -.6778448 | .3865627  | -1.75 | 0.088 | -1.4604 .1047104     |
| pp1529  | -.003023  | .0970217  | -0.03 | 0.975 | -.1994331 .1933871   |
| crack   | .3856919  | .3425114  | 1.13  | 0.267 | -.3076861 1.07907    |
| rtpipc  | -.2482905 | .1239648  | -2.00 | 0.052 | -.4992442 .0026632   |
| unrate  | -.1237299 | .0670494  | -1.85 | 0.073 | -.2594643 .0120046   |
| crmurpc |           |           |       |       |                      |
| L1.     | .9153736  | .0655541  | 13.96 | 0.000 | .7826663 1.048081    |
| _cons   | 5.672326  | 4.142842  | 1.37  | 0.179 | -2.71442 14.05907    |

```
. estat bgodfrey, lags(1) small
```

Breusch-Godfrey LM test for autocorrelation

| lags(p) | F     | df        | Prob > F |
|---------|-------|-----------|----------|
| 1       | 3.304 | ( 1, 37 ) | 0.0772   |

H0: no serial correlation

```
. regress gunhomrate lcmban fedban pp1529 crack rtpipc unrate L.gunhomrate
```

| Source   | SS         | df | MS         | Number of obs | = | 44     |
|----------|------------|----|------------|---------------|---|--------|
| Model    | 130.524965 | 7  | 18.6464235 | F(7, 36)      | = | 56.08  |
| Residual | 11.9699041 | 36 | .332497336 | Prob > F      | = | 0.0000 |
| Total    | 142.494869 | 43 | 3.31383416 | R-squared     | = | 0.9160 |
|          |            |    |            | Adj R-squared | = | 0.8997 |
|          |            |    |            | Root MSE      | = | .57663 |

| gunhomrate | Coef.    | Std. Err. | t    | P> t  | [95% Conf. Interval] |
|------------|----------|-----------|------|-------|----------------------|
| lcmban     | 1.219866 | .5469665  | 2.23 | 0.032 | .1105663 2.329165    |

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|            |           |          |       |       |           |           |
|------------|-----------|----------|-------|-------|-----------|-----------|
| fedban     | -.6035338 | .319288  | -1.89 | 0.067 | -1.25108  | .0440122  |
| pp1529     | -.0490334 | .0777201 | -0.63 | 0.532 | -.206657  | .1085902  |
| crack      | .602306   | .2905786 | 2.07  | 0.045 | .0129852  | 1.191627  |
| rtpipc     | -.248543  | .1099859 | -2.26 | 0.030 | -.4716047 | -.0254813 |
| unrate     | -.102815  | .055463  | -1.85 | 0.072 | -.2152991 | .009669   |
| gunhomrate |           |          |       |       |           |           |
| L1.        | .9880207  | .0668339 | 14.78 | 0.000 | .8524753  | 1.123566  |
| _cons      | 5.857603  | 3.459172 | 1.69  | 0.099 | -1.157922 | 12.87313  |

. estat bgodfrey, lags(1) small

Breusch-Godfrey LM test for autocorrelation

| lags(p) | F     | df        | Prob > F |
|---------|-------|-----------|----------|
| 1       | 4.477 | ( 1, 35 ) | 0.0415   |

H0: no serial correlation

.

. log close  
 name: <unnamed>  
 log: C:\Users\cemood\Box Sync\California\report.log  
 log type: text  
 closed on: 18 Oct 2017, 09:34:02

## APPENDIX 2

Complete output of the Stata program used to generate the results reported in Section VI.C.

```
-----  
-----  
  
name: <unnamed>  
  
log: C:\Users\cemood\Box Sync\California\Virginia\va.log  
  
log type: text  
  
opened on: 26 Oct 2017, 08:52:43  
  
  
. use va.dta, clear;  
  
  
. tsset year;  
  
time variable: year, 1990 to 2013  
  
delta: 1 unit  
  
  
. rename lgunhomrate gun_hom_rate;  
  
  
. rename lcrmurpc murder_rate;  
  
  
. /* gun homicide */  
> dfgls gun_hom_rate;  
  
  
DF-GLS for gun_hom_rate                                         Number of obs = 14  
Maxlag = 8 chosen by Schwert criterion  
  
  
DF-GLS tau      1% Critical      5% Critical      10% Critical
```

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| [lags] | Test Statistic | Value  | Value  | Value  |
|--------|----------------|--------|--------|--------|
| <hr/>  |                |        |        |        |
| 8      | -1.659         | -3.770 | -4.084 | -3.139 |
| 7      | -1.735         | -3.770 | -3.465 | -2.719 |
| 6      | -1.855         | -3.770 | -3.116 | -2.510 |
| 5      | -1.993         | -3.770 | -2.981 | -2.468 |
| 4      | -2.328         | -3.770 | -3.009 | -2.548 |
| 3      | -2.103         | -3.770 | -3.143 | -2.705 |
| 2      | -1.796         | -3.770 | -3.332 | -2.896 |
| 1      | -1.405         | -3.770 | -3.521 | -3.075 |

Opt Lag (Ng-Perron seq t) = 0 [use maxlag(0)]

Min SC = -4.374397 at lag 1 with RMSE .0929491

Min MAIC = -4.070523 at lag 1 with RMSE .0929491

. regress gun\_hom\_rate pctlcm;

| Source       | SS         | df        | MS         | Number of obs | =                    | 20     |
|--------------|------------|-----------|------------|---------------|----------------------|--------|
|              |            |           |            | F(1, 18)      | =                    | 9.21   |
| Model        | .359084435 | 1         | .359084435 | Prob > F      | =                    | 0.0071 |
| Residual     | .701959689 | 18        | .038997761 | R-squared     | =                    | 0.3384 |
|              |            |           |            | Adj R-squared | =                    | 0.3017 |
| Total        | 1.06104412 | 19        | .055844428 | Root MSE      | =                    | .19748 |
| <hr/>        |            |           |            |               |                      |        |
| gun_hom_rate | Coef.      | Std. Err. | t          | P> t          | [95% Conf. Interval] |        |

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| pctlcm | -.0282314 | .0093037 | -3.03 | 0.007 | -.0477778 | -.0086851 |  |
|--------|-----------|----------|-------|-------|-----------|-----------|--|
| _cons  | 1.928703  | .1727546 | 11.16 | 0.000 | 1.565759  | 2.291647  |  |

```
. regress gun_hom_rate pctlcm trend;
```

| Source   | SS         | df | MS         | Number of obs | = | 20     |
|----------|------------|----|------------|---------------|---|--------|
|          |            |    |            | F(2, 17)      | = | 39.91  |
| Model    | .874730451 | 2  | .437365225 | Prob > F      | = | 0.0000 |
| Residual | .186313673 | 17 | .010959628 | R-squared     | = | 0.8244 |
|          |            |    |            | Adj R-squared | = | 0.8037 |
| Total    | 1.06104412 | 19 | .055844428 | Root MSE      | = | .10469 |

| gun_hom_rate | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|--------------|-----------|-----------|-------|-------|----------------------|
| pctlcm       | -.0060742 | .0058958  | -1.03 | 0.317 | -.0185132 .0063648   |
| trend        | -.0332869 | .0048528  | -6.86 | 0.000 | -.0435255 -.0230483  |
| _cons        | 1.947032  | .0916205  | 21.25 | 0.000 | 1.75373 2.140335     |

```
. estat bgodfrey, lags(1) small;
```

Breusch-Godfrey LM test for autocorrelation

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| lags(p) |  | F     | df        | Prob > F |
|---------|--|-------|-----------|----------|
| <hr/>   |  |       |           |          |
| 1       |  | 1.700 | ( 1, 16 ) | 0.2108   |
| <hr/>   |  |       |           |          |

H0: no serial correlation

. estat hettest;

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of gun\_hom\_rate

chi2(1) = 0.49

Prob > chi2 = 0.4822

. regress D.gun\_hom\_rate D.pctlcm;

| Source   |  | SS         | df | MS         | Number of obs | = | 19      |
|----------|--|------------|----|------------|---------------|---|---------|
|          |  |            |    |            | F(1, 17)      | = | 0.45    |
| Model    |  | .006849736 | 1  | .006849736 | Prob > F      | = | 0.5130  |
| Residual |  | .260889351 | 17 | .015346432 | R-squared     | = | 0.0256  |
|          |  |            |    |            | Adj R-squared | = | -0.0317 |
| Total    |  | .267739087 | 18 | .014874394 | Root MSE      | = | .12388  |
| <hr/>    |  |            |    |            |               |   |         |

D. |

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```
gun_hom_rate |      Coef.    Std. Err.      t    P>|t|    [95% Conf. Interval]
-----+-----
pctlcm | 
D1. | -.0062635   .0093753    -0.67   0.513    -.0260436   .0135166
|
_cons | -.0374536   .0297062    -1.26   0.224    -.1001283   .0252211
-----
```

```
. predict e, resid;
(5 missing values generated)
```

```
. estat bgodfrey, lags(1) small;
```

Breusch-Godfrey LM test for autocorrelation

```
lags(p) |      F          df          Prob > F
-----+-----
1 |     6.520        ( 1,   16 )       0.0213
-----
```

H0: no serial correlation

```
. regress e L.e D.pctlcm;
```

| Source | SS         | df | MS         | Number of obs | = | 18     |
|--------|------------|----|------------|---------------|---|--------|
|        |            |    |            | F(2, 15)      | = | 4.05   |
| Model  | .089776188 | 2  | .044888094 | Prob > F      | = | 0.0392 |

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|          |             |           |            |               |                      |           |
|----------|-------------|-----------|------------|---------------|----------------------|-----------|
| Residual | .166197694  | 15        | .011079846 | R-squared     | =                    | 0.3507    |
|          | -----+----- |           |            | Adj R-squared | =                    | 0.2642    |
| Total    | .255973881  | 17        | .015057287 | Root MSE      | =                    | .10526    |
| <hr/>    |             |           |            |               |                      |           |
| e        | Coef.       | Std. Err. | t          | P> t          | [95% Conf. Interval] |           |
|          | -----+----- |           |            |               |                      |           |
| e        |             |           |            |               |                      |           |
| L1.      | -.5928103   | .208259   | -2.85      | 0.012         | -1.036704            | -.1489167 |
|          |             |           |            |               |                      |           |
| pctlcm   |             |           |            |               |                      |           |
| D1.      | -.0014458   | .0079844  | -0.18      | 0.859         | -.0184641            | .0155725  |
|          |             |           |            |               |                      |           |
| _cons    | -.0045456   | .0258962  | -0.18      | 0.863         | -.0597421            | .0506509  |
| <hr/>    |             |           |            |               |                      |           |

. newey D.gun\_hom\_rate D.pctlcm, lag(1);

|  |               |   |        |
|--|---------------|---|--------|
| Regression with Newey-West standard errors | Number of obs | = | 19     |
| maximum lag: 1                             | F( 1, 17)     | = | 0.55   |
|  | Prob > F      | = | 0.4683 |
| <hr/>                                      |               |   |        |

|              |             |           |   |      |                      |  |
|--------------|-------------|-----------|---|------|----------------------|--|
| D.           | Newey-West  |           |   |      |                      |  |
| gun_hom_rate | Coef.       | Std. Err. | t | P> t | [95% Conf. Interval] |  |
|              | -----+----- |           |   |      |                      |  |

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```
pctlcm |  
  
D1. | -.0062635 .0084435 -0.74 0.468 -.0240778 .0115508  
|  
_cons | -.0374536 .0224824 -1.67 0.114 -.0848873 .0099801  
  
-----  
  
. /* UCR murder rate */  
  
> drop e;  
  
. dfgls murder_rate;  
  
DF-GLS for murder_rate Number of obs = 15  
Maxlag = 8 chosen by Schwert criterion  
  
DF-GLS tau 1% Critical 5% Critical 10% Critical  
[lags] Test Statistic Value Value Value  
-----  
8 -1.274 -3.770 -3.702 -2.892  
7 -1.468 -3.770 -3.257 -2.604  
6 -1.768 -3.770 -3.024 -2.482  
5 -2.542 -3.770 -2.960 -2.489  
4 -2.651 -3.770 -3.021 -2.590  
3 -2.528 -3.770 -3.163 -2.748  
2 -1.553 -3.770 -3.343 -2.927  
1 -1.483 -3.770 -3.517 -3.091
```

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Opt Lag (Ng-Perron seq t) = 3 with RMSE .0627365

Min SC = -4.815476 at lag 3 with RMSE .0627365

Min MAIC = -4.549201 at lag 1 with RMSE .0764065

. regress murder\_rate pctlcm;

| Source   | SS         | df | MS         | Number of obs | = | 21     |
|----------|------------|----|------------|---------------|---|--------|
|          |            |    |            | F(1, 19)      | = | 8.48   |
| Model    | .354364145 | 1  | .354364145 | Prob > F      | = | 0.0089 |
| Residual | .793680104 | 19 | .041772637 | R-squared     | = | 0.3087 |
|          |            |    |            | Adj R-squared | = | 0.2723 |
| Total    | 1.14804425 | 20 | .057402212 | Root MSE      | = | .20438 |

| murder_rate | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|-------------|-----------|-----------|-------|-------|----------------------|
| pctlcm      | -.0269564 | .0092551  | -2.91 | 0.009 | -.0463276 -.0075852  |
| _cons       | 2.205412  | .1746858  | 12.63 | 0.000 | 1.839791 2.571034    |

. regress murder\_rate pctlcm trend;

| Source   | SS         | df | MS         | Number of obs | = | 21     |
|----------|------------|----|------------|---------------|---|--------|
|          |            |    |            | F(2, 18)      | = | 60.74  |
| Model    | .999887087 | 2  | .499943544 | Prob > F      | = | 0.0000 |
| Residual | .148157162 | 18 | .008230953 | R-squared     | = | 0.8709 |

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|       |            |               | Adj R-squared | = | 0.8566 |
|-------|------------|---------------|---------------|---|--------|
| Total | 1.14804425 | 20 .057402212 | Root MSE      | = | .09072 |

| murder_rate | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|-------------|-----------|-----------|-------|-------|----------------------|
| pctlcm      | -.0002804 | .0050943  | -0.06 | 0.957 | -.0109831 .0104223   |
| trend       | -.0359031 | .0040542  | -8.86 | 0.000 | -.0444205 -.0273856  |
| _cons       | 2.185345  | .0775751  | 28.17 | 0.000 | 2.022365 2.348324    |

```
. estat bgodfrey, lags(1) small;
```

Breusch-Godfrey LM test for autocorrelation

| lags(p) | F     | df        | Prob > F |
|---------|-------|-----------|----------|
| 1       | 4.657 | ( 1, 17 ) | 0.0455   |

H0: no serial correlation

```
. estat hettest;
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of murder\_rate

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```
chi2(1)      =     0.11
Prob > chi2  =  0.7351
```

```
. regress D.murder_rate D.pctlcm;
```

| Source   | SS         | df | MS         | Number of obs | = | 20      |
|----------|------------|----|------------|---------------|---|---------|
|          |            |    |            | F(1, 18)      | = | 0.01    |
| Model    | .000081479 | 1  | .000081479 | Prob > F      | = | 0.9241  |
| Residual | .157061195 | 18 | .008725622 | R-squared     | = | 0.0005  |
|          |            |    |            | Adj R-squared | = | -0.0550 |
| Total    | .157142674 | 19 | .008270667 | Root MSE      | = | .09341  |

| D.          |  |           |           |       |       |                      |
|-------------|--|-----------|-----------|-------|-------|----------------------|
| murder_rate |  | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
| pctlcm      |  |           |           |       |       |                      |
| D1.         |  | .0005721  | .0059201  | 0.10  | 0.924 | -.0118656 .0130098   |
|             |  |           |           |       |       |                      |
| _cons       |  | -.0388827 | .0210796  | -1.84 | 0.082 | -.0831694 .0054039   |

```
. predict e, resid;
(4 missing values generated)
```

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```
. estat bgodfrey, lags(1) small;
```

Breusch-Godfrey LM test for autocorrelation

| lags(p) | F     | df        | Prob > F |
|---------|-------|-----------|----------|
| 1       | 3.877 | ( 1, 17 ) | 0.0655   |

H0: no serial correlation

```
. regress e L.e D.pctlcm;
```

| Source   | SS         | df | MS         | Number of obs | = | 19     |
|----------|------------|----|------------|---------------|---|--------|
|          |            |    |            | F(2, 16)      | = | 2.07   |
| Model    | .030759281 | 2  | .01537964  | Prob > F      | = | 0.1589 |
| Residual | .118985178 | 16 | .007436574 | R-squared     | = | 0.2054 |
|          |            |    |            | Adj R-squared | = | 0.1061 |
| Total    | .149744459 | 18 | .008319137 | Root MSE      | = | .08624 |

| e      | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|--------|-----------|-----------|-------|-------|----------------------|
| L1.    | -.4590299 | .2257132  | -2.03 | 0.059 | -.9375206 .0194608   |
| pctlcm |           |           |       |       |                      |

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|       |  |           |          |       |       |           |          |
|-------|--|-----------|----------|-------|-------|-----------|----------|
| D1.   |  | -.0029138 | .0056386 | -0.52 | 0.612 | -.0148671 | .0090396 |
|       |  |           |          |       |       |           |          |
| _cons |  | -.0040169 | .0199469 | -0.20 | 0.843 | -.0463025 | .0382688 |

. newey D.murder\_rate D.pctlcm, lag(1);

|  |               |   |        |
|--|---------------|---|--------|
| Regression with Newey-West standard errors | Number of obs | = | 20     |
| maximum lag: 1                             | F( 1, 18)     | = | 0.02   |
|  | Prob > F      | = | 0.9027 |

| Newey-West  |  |           |           |       |       |                      |
|-------------|--|-----------|-----------|-------|-------|----------------------|
| murder_rate |  | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
| pctlcm      |  |           |           |       |       |                      |
| D1.         |  | .0005721  | .0046124  | 0.12  | 0.903 | -.0091182 .0102623   |
|             |  |           |           |       |       |                      |
| _cons       |  | -.0388827 | .0167536  | -2.32 | 0.032 | -.0740808 -.0036846  |

. nbreg crmur pctlcm;

Fitting Poisson model:

Iteration 0: log likelihood = -176.04004

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Iteration 1: log likelihood = -176.04004

Fitting constant-only model:

Iteration 0: log likelihood = -147.583

Iteration 1: log likelihood = -118.99564

Iteration 2: log likelihood = -118.69212

Iteration 3: log likelihood = -118.68877

Iteration 4: log likelihood = -118.68877

Fitting full model:

Iteration 0: log likelihood = -115.89173

Iteration 1: log likelihood = -115.44161

Iteration 2: log likelihood = -115.43209

Iteration 3: log likelihood = -115.43209

|                              |               |   |        |
|------------------------------|---------------|---|--------|
| Negative binomial regression | Number of obs | = | 21     |
|                              | LR chi2(1)    | = | 6.51   |
| Dispersion = mean            | Prob > chi2   | = | 0.0107 |
| Log likelihood = -115.43209  | Pseudo R2     | = | 0.0274 |

---

| crmur  | Coef.    | Std. Err. | z     | P> z  | [95% Conf. Interval]   |
|--------|----------|-----------|-------|-------|------------------------|
| pctlcm | -.018751 | .0067401  | -2.78 | 0.005 | -.0319614    -.0055406 |

---

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|          |           |          |       |       |           |           |
|----------|-----------|----------|-------|-------|-----------|-----------|
| _cons    | 6.364963  | .1266425 | 50.26 | 0.000 | 6.116748  | 6.613178  |
| /lnalpha | -3.995576 | .3466636 |       |       | -4.675024 | -3.316128 |
| alpha    | .0183968  | .0063775 |       |       | .0093253  | .0362931  |

LR test of alpha=0: chibar2(01) = 121.22 Prob >= chibar2 = 0.000

. nbreg crmur pctlcm trend;

Fitting Poisson model:

Iteration 0: log likelihood = -113.64944  
 Iteration 1: log likelihood = -113.64944

Fitting constant-only model:

Iteration 0: log likelihood = -147.583  
 Iteration 1: log likelihood = -118.99564  
 Iteration 2: log likelihood = -118.69212  
 Iteration 3: log likelihood = -118.68877  
 Iteration 4: log likelihood = -118.68877

Fitting full model:

Iteration 0: log likelihood = -110.86745

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```
Iteration 1: log likelihood = -107.26037
Iteration 2: log likelihood = -106.58883
Iteration 3: log likelihood = -104.99581
Iteration 4: log likelihood = -104.2693
Iteration 5: log likelihood = -104.26131
Iteration 6: log likelihood = -104.2613
```

|                              |               |   |        |
|------------------------------|---------------|---|--------|
| Negative binomial regression | Number of obs | = | 21     |
|                              | LR chi2(2)    | = | 28.85  |
| Dispersion = mean            | Prob > chi2   | = | 0.0000 |
| Log likelihood = -104.2613   | Pseudo R2     | = | 0.1216 |

| crmur                                   | Coef.     | Std. Err. | z     | P> z                    | [95% Conf. Interval] |           |
|---|-----------|-----------|-------|-------------------------|----------------------|-----------|
| <hr/>                                   |           |           |       |                         |                      |           |
| pctlcm                                  | -.000778  | .0048192  | -0.16 | 0.872                   | -.0102235            | .0086674  |
| trend                                   | -.0236072 | .0037308  | -6.33 | 0.000                   | -.0309194            | -.0162949 |
| _cons                                   | 6.337044  | .0737494  | 85.93 | 0.000                   | 6.192498             | 6.48159   |
| <hr/>                                   |           |           |       |                         |                      |           |
| /lnalpha                                | -5.347352 | .4648032  |       |                         | -6.25835             | -4.436355 |
| <hr/>                                   |           |           |       |                         |                      |           |
| alpha                                   | .0047607  | .0022128  |       |                         | .0019144             | .011839   |
| <hr/>                                   |           |           |       |                         |                      |           |
| LR test of alpha=0: chibar2(01) = 18.78 |           |           |       | Prob >= chibar2 = 0.000 |                      |           |

. nbreg gunhomicides pctlcm;

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Fitting Poisson model:

Iteration 0: log likelihood = -139.64638

Iteration 1: log likelihood = -139.64638

Fitting constant-only model:

Iteration 0: log likelihood = -134.6247

Iteration 1: log likelihood = -107.73181

Iteration 2: log likelihood = -107.37966

Iteration 3: log likelihood = -107.37576

Iteration 4: log likelihood = -107.37576

Fitting full model:

Iteration 0: log likelihood = -104.25441

Iteration 1: log likelihood = -103.65453

Iteration 2: log likelihood = -103.64182

Iteration 3: log likelihood = -103.64181

|                              |               |   |        |
|------------------------------|---------------|---|--------|
| Negative binomial regression | Number of obs | = | 20     |
|                              | LR chi2(1)    | = | 7.47   |
| Dispersion = mean            | Prob > chi2   | = | 0.0063 |
| Log likelihood = -103.64181  | Pseudo R2     | = | 0.0348 |

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| gunhomicides | Coef.     | Std. Err. | z     | P> z  | [95% Conf. Interval] |           |
|--------------|-----------|-----------|-------|-------|----------------------|-----------|
| <hr/>        |           |           |       |       |                      |           |
| pctlcm       | -.0208157 | .0068776  | -3.03 | 0.002 | -.0342956            | -.0073358 |
| _cons        | 6.098731  | .1269795  | 48.03 | 0.000 | 5.849856             | 6.347606  |
| <hr/>        |           |           |       |       |                      |           |
| /lnalpha     | -4.079971 | .3734793  |       |       | -4.811977            | -3.347965 |
| <hr/>        |           |           |       |       |                      |           |
| alpha        | .016908   | .0063148  |       |       | .0081318             | .0351558  |
| <hr/>        |           |           |       |       |                      |           |

LR test of alpha=0: chibar2(01) = 72.01 Prob >= chibar2 = 0.000

. nbreg gunhomicides pctlcm trend;

Fitting Poisson model:

Iteration 0: log likelihood = -105.02403

Iteration 1: log likelihood = -105.02402

Fitting constant-only model:

Iteration 0: log likelihood = -134.6247

Iteration 1: log likelihood = -107.73181

Iteration 2: log likelihood = -107.37966

Iteration 3: log likelihood = -107.37576

Iteration 4: log likelihood = -107.37576

Fitting full model:

```
Iteration 0:  log likelihood = -100.6319
Iteration 1:  log likelihood = -96.977163
Iteration 2:  log likelihood = -96.162899
Iteration 3:  log likelihood = -96.134374
Iteration 4:  log likelihood = -96.134321
Iteration 5:  log likelihood = -96.134321
```

|                              |               |   |        |
|------------------------------|---------------|---|--------|
| Negative binomial regression | Number of obs | = | 20     |
|                              | LR chi2(2)    | = | 22.48  |
| Dispersion = mean            | Prob > chi2   | = | 0.0000 |
| Log likelihood = -96.134321  | Pseudo R2     | = | 0.1047 |

| gunhomicides | Coef.     | Std. Err. | z     | P> z  | [95% Conf. Interval] |           |
|--------------|-----------|-----------|-------|-------|----------------------|-----------|
| <hr/>        |           |           |       |       |                      |           |
| pctlcm       | -.0066636 | .0055574  | -1.20 | 0.231 | -.017556             | .0042288  |
| trend        | -.0210376 | .0044435  | -4.73 | 0.000 | -.0297468            | -.0123285 |
| _cons        | 6.10229   | .086847   | 70.26 | 0.000 | 5.932073             | 6.272507  |
| <hr/>        |           |           |       |       |                      |           |
| /lnalpha     | -5.069808 | .4764139  |       |       | -6.003562            | -4.136053 |
| <hr/>        |           |           |       |       |                      |           |
| alpha        | .0062836  | .0029936  |       |       | .0024699             | .0159858  |
| <hr/>        |           |           |       |       |                      |           |

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```
LR test of alpha=0: chibar2(01) = 17.78          Prob >= chibar2 = 0.000
```

```
. log close;  
  
name: <unnamed>  
  
log: C:\Users\cemood\Box Sync\California\Virginia\va.log  
  
log type: text  
  
closed on: 26 Oct 2017, 08:52:44
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# EXHIBIT 9

**ER\_837**

Carlisle E. Moody

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Department of Economics  
College of William and Mary  
Williamsburg, VA 23187-8795  
Email: cemood@wm.edu  
Office: (757) 221-2373; Cell (757)870-7708

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#### Education

B.A., Colby College, Waterville, Maine, 1965 (Economics)  
M.A., University of Connecticut, Storrs, Connecticut, 1966 (Economics)  
Ph.D., University of Connecticut, Storrs, Connecticut, 1970 (Economics)

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#### Experience

Professor of Economics, College of William and Mary, 1989-  
Chair of the Department of Economics, College of William and Mary 1997- 2003  
Associate Professor of Economics, College of William and Mary, 1975-1989.  
Assistant Professor of Economics, College of William and Mary, 1970-1975.  
Lecturer in Econometrics, University of Leeds, Leeds, England, 1968-1970.

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#### Consultant

Stanford Research Institute  
Virginia Marine Resources Commission  
U.S. General Accounting Office  
U.S. Department of Transportation  
U.S. Department of Energy  
National Center for State Courts  
Oak Ridge National Laboratory  
Justec Research.  
The Orkand Corporation  
Washington Consulting Group  
Decision Analysis Corporation of Virginia  
SAIC Corporation  
West Publishing Group  
Independent Institute

## Research and Teaching Fields

Law and Economics  
Econometrics  
Time Series Analysis

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## Honors

National Defense Education Act Fellow, University of Connecticut, 1965-1968.

Bredin Fellow, College of William and Mary, 1982.

Member, Methodology Review Panel, Prison Population Forecast, Virginia Department of Planning and Budget, 1987-1993.

Notable Individuals, Micro Computer Industry, 1983.

Speaker, Institute of Medicine and National Research Council Committee of Priorities for a Public Health Research Agenda to Reduce the Threat of Firearm-related Violence, National Academies of Science, Washington, DC, April 23, 2013.

Member, Methodology Review Panel, Prison Population Forecast, Virginia Department of Corrections, 2012-.

Principal Investigator, Rand Corporation Grant No. 790751, Estimating the Impact of Three Categories of Gun-Related Laws, 2019-2020, \$57,042.

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## Refereed Publications

“Do White Police Officers Unfairly Target Black Suspects?” (with J.R. Lott) *Economics, Law and Policy*, forthcoming.

“Clustering and Standard Error Bias in Fixed Effects Panel Data Regressions,” (with T.B. Marvell) *Journal of Quantitative Criminology*, 36, 347-369. 2020.

<https://link.springer.com/article/10.1007/s10940-018-9383-z>

“Brought into the Open: How the U.S. Compares with Other Countries in the Rate of Public Mass Shooters,” (with John Lott), *Econ Journal Watch* 71(1), 2020.

“Econometric Modeling and Model Falsification,” (with George M. Lady), *Advances in Pure Mathematics* 9(9), 2019.

<http://www.scirp.org/journal/paperinformation.aspx?paperid=95039>

“Do Right to Carry Laws Increase Violent Crime? A Comment on Donohue, Aneja, and Weber,” (with T.B. Marvell) *Econ Journal Watch*, 16(1), 2019.

“Is the United States an Outlier in Mass Public Shootings? A Comment on Adam Lankford.” (with John Lott) *Econ Journal Watch*, 16(1), 2019.

“The Impact of Right-to-Carry Laws: Critique of the 2014 version of Aneja, Donohue, and Zhang,” (with T.B. Marvell) *Econ Journal Watch*, February 2018.

“Firearms and the Decline in Violence in Europe 1201-2010,” *Review of European Studies*, 9(2) 2017

“The Impact of Right-to-Carry Laws on Crime: An Exercise in Replication,” (with T.B. Marvell, P.R. Zimmerman and Fisal Alemante) *Review of Economics and Finance*, 4(1) 2014, 33-43.

“Did John Lott Provide Bad Data to the NRC? A Note on Aneja, Donohue, and Zhang,” (with J.R. Lott and T.B. Marvell) *Econ Journal Watch*, January 2013.

“On the Choice of Control Variables in the Crime Equation,” (with T.B. Marvell) *Oxford Bulletin of Economics and Statistics*, 72(5) 2010, 696-715.

“The Debate on Shall-Issue Laws, Continued,” (with T.B. Marvell) *Econ Journal Watch*, 6(2) March 2009, 203-217.

“The Debate on Shall-Issue Laws,” (with T.B. Marvell) *Econ Journal Watch*, 5(3) September 2008, 269-293.

“Can and Should Criminology Research Influence Policy? Suggestions for Time-Series Cross-Section Studies” (with T.B. Marvell) *Criminology and Public Policy* 7(1) August, 2008, 359-364.

“Guns and Crime,” (with T.B. Marvell), *Southern Economic Journal*, 71(4), April, 2005, 720-736.

“When Prisoners Get Out,” (with Kovandzic, Marvell and Vieraitis), *Criminal Justice Policy Review*, 15, 2004, 212-228.

“The Impact of Right-to-Carry Concealed Firearms Laws on Mass Public Shootings,” (with Tomislav Kovandzic and Grant Duwe), *Homicide Studies*, 6, 2002, 271-296.

"Testing for the Effects of Concealed Weapons Laws: Specification Errors and Robustness," *Journal of Law and Economics*, 44 (PT.2), 2001, 799-813.

"The Lethal Effects of Three-Strikes Laws," (with T.B. Marvell), *Journal of Legal Studies*, 30, 2001, 89-106.

"Female and Male Homicide Victimization Rates: Comparing Trends and Regressors," (with T. B. Marvell), *Criminology*, 37, 1999, 879-902.

"The Impact of Out-of-State Prison Population on State Homicide Rates: Displacement and Free-Rider Effects," (with T.B. Marvell), *Criminology*, 30, 1998, 513-535.

"The Impact of Prison Growth on Homicide," (with T.B. Marvell) *Homicide Studies*, 1, 1997, 215-233.

"Age Structure, Trends, and Prison Populations," (with T.B. Marvell) *Journal of Criminal Justice*, 25, 1997, 114-124.

"Police Levels, Crime Rates, and Specification Problems," (with T.B. Marvell) *Criminology*, 24, 1996, 606-646.

"A Regional Linear Logit Fuel Demand Model for Electric Utilities," *Energy Economics*, 18, 1996, 295-314.

"The Uncertain Timing of Innovations in Time Series: Minnesota Sentencing Guidelines and Jail Sentences," (with T.B. Marvell) *Criminology*, 34, May, 1996.

"Determinant Sentencing and Abolishing Parole: the Long Term Impacts on Prisons and Crime," (with T.B. Marvell), *Criminology*, 34, 1996.

"The Impact of Enhanced Prison Terms for Felonies Committed with Guns" (with T.B. Marvell) *Criminology*, Vol. 33, 1995.

"Prison Population Growth and Crime Reduction." (with T.B. Marvell) *Journal of Quantitative Criminology*, 10, 1994, 109-140.

"Alternative Bidding Systems for Leasing Offshore Oil: Experimental Evidence." *Economica*, 61, 1994, 345-353.

"Forecasting the Marginal Costs of a Multiple Output Production Technology." (with G. Lady), *Journal of Forecasting*, 12, 1993, 421-436.

"Volunteer Attorneys as Appellate Judges." (with T.B. Marvell) *The Justice System Journal*, 16, 1992, 49-64.

"Age Structure and Crime Rates: Conflicting Evidence." (with T.B. Marvell) *Journal of Quantitative Criminology*, 7, 1991, 237-273.

"OCS Leasing Policy and Lease Prices." (with W.J. Kruvant) *Land Economics*, 66, February 1990, 30-39.

"The Effectiveness of Measures to Increase Appellate Court Efficiency and Decision Output." (with T.B. Marvell) *Michigan Journal of Law Reform*, 21, 1988, 415- 442.

"Joint Bidding, Entry, and OCS Lease Prices" (with W.J. Kruvant) *Rand Journal of Economics*, 19, Summer 1988, 276-284.

"Appellate and Trial Caseload Growth: A Pooled Time Series Cross Section Approach" (with T.B. Marvell) *Journal of Quantitative Criminology*, 3, 1987.

"The Impact of Economic and Judgeship Changes on Federal District Court Filings" (with T.B. Marvell) *Judicature*, Vol. 69, No. 3, Oct./Nov. 1985, 156.

"The GAO Natural Gas Supply Model" (with P.A. Valentine and W.J. Kruvant) *Energy Economics*, January 1985, 49-57.

"Strategy, Structure and Performance of Major Energy Producers: Evidence from Line of Business Data" (with A.T. Andersen and J.A. Rasmussen) *Review of Industrial Organization*, Winter, 1984: 290-307.

"Quality, Price, Advertising and Published Quality Ratings" (with R.A. Archibald and C.A. Haulman) *Journal of Consumer Research*, Vol. 4, No. 4, March 1983, 347-56.

"Sources of Productivity Decline in U.S. Coal Mining" (with W. Kruvant and P. Valentine) *The Energy Journal*, Vol. 3, No. 3, 1982, 53-70.

"Seasonal Variation in Residential Electricity Demand: Evidence from Survey Data," (with R.A. Archibald and D.H. Finifter), *Applied Economics*, Vol. 14, No. 2, April 1982, 167-181.

"The Subsidy Effects of the Crude Oil Entitlements Program," *Atlantic Economic Journal*, Vol. 8, No. 2, July, 1980, 103.

"Industrial Generation of Electricity in 1985: A Regional Forecast," *Review of Regional Studies*, Vol. 8, No. 2, 1980, 33-43.

"The Measurement of Capital Services by Electrical Energy," *Oxford Bulletin of Economics and Statistics*, February 1974.

"Air Quality, Environment and Metropolitan Community Structure" (With Craig Humphrey), *Review of Regional Studies*, Winter 1973.

"Productivity Change in Zambian Mining" (With Norman Kessel), *South African Journal of Economics*, March 1972.

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#### Other Publications

Heller, McDonald and Murder: Testing the More Guns=More Murder Thesis," (with Don Kates), *Fordham Urban Law Review*, Vol. 39, No. 5, 2012.

"Brief for the International Law Enforcement Educators and Trainers Association (ILEETA), International Association of Law Enforcement Firearms Instructors (IALEFI), Southern States Police Benevolent Association, Texas Police Chiefs Association, Law Enforcement Alliance of America, Congress of Racial Equality, the Claremont Institute, Professors Carlisle E. Moody, Roy T. Wortman, Raymond Kessler, Gary Mauser, Dr. Sterling Burnett, and the Independent Institute in Support of Petitioners," Supreme Court of the United States, No. 08-1521, Otis D. McDonald, et. al. vs City of Chicago, et.al., December 2009.

"Firearms and Homicide" in B. Benson and P. Zimmerman (eds.), *Handbook on the Economics of Crime*, Edward Elgar, Northampton, MA 2010, 432-451.

"Is there a Relationship between Guns and Freedom? Comparative Results from 59 Nations." (with David B. Kopel and Howard Nemerov), *Texas Review of Law and Politics* 13(1), 1-42, Fall 2008.

"Brief of Academics as Amici Curiae in Support of Respondent." Supreme Court of the United States, No. 07-290, District of Columbia vs. Dick Anthony Heller, February 2008. Cited by Breyer, J. Dissenting, pp. 21-22.

"Econometric Research on Crime Rates: Prisons, Crime, and Simultaneous Equations" in Mark Cohen and Jacek Czabanske, *Ekonomiczne, Podejście Do Przestępcości*, Ius et Lux, Warsaw, 2007, 235-258 (in Polish).

"Simulation Modeling and Policy Analysis," *Criminology & Public Policy*, 1, 2002, 393-398.

"Unintended Consequences: Three Strikes Laws and the Murders of Police Officers," (with T. Marvell and R. Kaminski), *National Institute of Justice* (NCJ Number 203649), 2002.

"Game Theory and Football" (with David Ribar), *Access: The Journal of Microcomputer Applications*, Vol. 4, No. 3, Nov./Dec. 1985, 5-15.

"Reasons for State Appellate Caseload Growth" (with T. Marvell) Bureau of Justice Statistics, Department of Justice, 1985.

"State Appellate Caseload Growth: Documentary Appendix." (with Marvell, et. al.) National Center for State Courts, Williamsburg, VA, 1985.

Case 3:17-cv-01017-BEN-JLB Document 132-3 Filed 12/01/22 PageID.17162 Page 67 of 68

"Model Documentation for the Mini-Macroeconomic Model: MINMAC" Washington, D.C., Energy Information Administration, 1984.

"Neighborhood Segregation." (with E.S. Dethlefsen.) *Byte, The Small Systems Journal*, Vol. 7, No. 7, July 1982, 178-206.

"Technological Progress and Energy Use," Proceedings of the Third Annual University of Missouri, Missouri Energy Council Conference on Energy, October, 1976.

"Technological Change in the Soviet Chemical Industry," Technical Note SSC-TN-2625-8 Stanford Research Institute, 1975 (With F.W. Rushing).

"Feasibility Study of Inter-City Transit Via Southern Railway R/W, Norfolk and Virginia Beach Corridor" (With R.H. Bigelow, S.H. Baker and M.A. Garrett), U.S. Department of Transportation, 1974.

"Productivity Growth in U.S. Manufacturing," in 1973 Proceedings of the Business and Economic Statistics Section, American Statistical Association.

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**CERTIFICATE OF SERVICE**  
**UNITED STATES DISTRICT COURT**  
**SOUTHERN DISTRICT OF CALIFORNIA**

Case Name: *Duncan, et al. v. Becerra*  
Case No.: 17-cv-1017-BEN-JLB

**IT IS HEREBY CERTIFIED THAT:**

I, the undersigned, declare under penalty of perjury that I am a citizen of the United States over 18 years of age. My business address is 180 East Ocean Boulevard, Suite 200 Long Beach, CA 90802. I am not a party to the above-entitled action.

I have caused service of the following documents, described as:

**DECLARATION OF DR. CARLISLE E. MOODY IN SUPPORT OF  
PLAINTIFFS' SUPPLEMENTAL BRIEF; EXHIBITS 8-9**

on the following parties by electronically filing the foregoing on December 1, 2022, with the Clerk of the District Court using its ECF System, which electronically notifies them.

Rob Bonta  
Attorney General of California  
Mark R. Beckington  
Supervising Deputy Attorney General  
Kevin J. Kelly  
Deputy Attorney General  
300 South Spring Street, Suite 1702  
Los Angeles, CA 90013  
[kevin.kelly@doj.ca.gov](mailto:kevin.kelly@doj.ca.gov)

I declare under penalty of perjury that the foregoing is true and correct.  
Executed on December 1, 2022, at Long Beach, CA.

Laura Palmerin

## CERTIFICATE OF SERVICE

17cv1017

Case 3:17-cv-01017-BEN-JLB Document 132-4 Filed 12/01/22 PageID.17164 Page 1 of 17

1 C.D. Michel – SBN 144258  
2 Sean A. Brady – SBN 262007  
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5  
6 Attorneys for Plaintiffs  
7

8 IN THE UNITED STATES DISTRICT COURT  
9 FOR THE SOUTHERN DISTRICT OF CALIFORNIA

10 VIRGINIA DUNCAN, et al.,

11 Case No: 17-cv-1017-BEN-JLB

12 Plaintiffs,

13 v.  
14 XAVIER BECERRA, in his official  
capacity as Attorney General of the State  
of California,  
15 Defendant.

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**DECLARATION OF STEPHEN HELSLEY IN SUPPORT OF PLAINTIFFS' SUPPLEMENTAL BRIEF; EXHIBIT 10**

1  
DECLARATION OF STEPHEN HELSLEY

17cv1017

Case 3:17-cv-01017-BEN-JLB Document 132-4 Filed 12/01/22 PageID.17165 Page 2 of 17

## **DECLARATION OF STEPHEN HELSLEY**

1. I am Stephen Helsley, a retired peace officer from the California  
Department of Justice (DOJ). The bulk of that career was in drug enforcement. The  
last three positions I held were Chief of the Bureau of Narcotic Enforcement, Chief  
of the Bureau of Forensic Services and, finally, Assistant Director of the Division of  
Law Enforcement. As Assistant Director, I was responsible for the department's  
criminal, civil, and controlled substance investigations as well as law enforcement  
training, intelligence gathering and our forensic laboratory system. In my executive  
level positions, I had occasion to review special agent-involved shootings and a wide  
range of homicides involving firearms.

11       2. I was the DOJ's principal firearms instructor for many years, and I am an  
12      FBI-certified range master. I also participated in the firearm training that was part of  
13      the FBI National Academy Program in Quantico, VA. I am a member of the  
14      American Society of Arms Collectors and a technical advisor to the Association of  
15      Firearm and Tool Mark Examiners. For well over two decades, I was first a state  
16      liaison and, then later, a consultant to the National Rifle Association, where I was  
17      heavily involved in "assault weapon" and magazine legislative issues. For the past  
18      ten years I have also served as the historian for the London-based company, John  
19      Rigby & Co. (Gunmakers, Ltd.). Rigby is the oldest continuously operating gun  
20      maker in the English-speaking world, having been established in 1775.

21       3. I have co-authored five books on firearms and have authored or co-  
22 authored more than fifty firearm-related articles for U.S. and Russian journals.  
23 Throughout my adult life, I have been an active participant in handgun, rifle, and  
24 shotgun competitions. I have also been a firearm collector and ammunition reloader  
25 since the early 1960s.

26       4. Finally, I am a collector of firearm-related books—of which I have  
27 thousands. Included in my book collection are approximately 50 different issues of  
28 *Gun Digest*, the earliest of which is from 1944. It is a standard resource that is

Case 3:17-cv-01017-BEN-JLB Document 132-4 Filed 12/01/22 PageID.17166 Page 3 of 17

1 widely used by gun dealers and buyers alike. *Gun Digest* has traditionally provided a  
2 comprehensive overview of the firearms and related items available to retail buyers.

3 5. Attached hereto as **Exhibit 10** is a true and correct copy of my signed  
4 expert witness report previously submitted in this matter. Exhibit 10 contains my  
5 opinions and analysis relevant to this matter.

6 6. While I was unable to fully update my work in time to reflect post-2017  
7 research, I can confirm that I stand by my prior report. I have also made some limited  
8 additional findings, which will now be discussed in the remainder of this declaration.

9 7. During my 35-years of involvement in the “assault weapon” issue, I have  
10 heard innumerable times that the “founding fathers” never envisioned higher capacity  
11 firearms than the single shot musket of their day and that the Second Amendment was  
12 never intended to offer protection for such arms. Such a notion is preposterous.  
13 Among the Founders, George Washington and John Adams were personally involved  
14 in the consideration to purchase for the Continental Army 100 Belton 8-shot firearms,  
15 which were repeating muskets with detachable magazines. (Washington had been  
16 encouraged by Benjamin Franklin to consider the “Belton flintlock.”)

17 8. The Belton flintlock was one of a number of multi-shot firearms  
18 (including the Giradoni air rifle and the Lorenzoni among others) that were beginning  
19 to appear at the end of the 18<sup>th</sup> century. Such weapons were complex, likely  
20 unreliable, and fragile, but they were also a window into the future. The Belton  
21 purchase never materialized – primarily because of cost – but prescient men like the  
22 Founders surely understood that it would only be a matter of time before such arms  
23 were practical, affordable, and reliable. In the absence of government interest, private  
24 citizens would be clients for such arms, and the Founding generation imposed no  
25 restrictions to stop them.

26 9. The State also argues that magazines capable of holding more than 10  
27 rounds do not warrant Second Amendment protection because they are  
28 “accoutrements” (accessories) and not necessary to the functioning of the firearm for

Case 3:17-cv-01017-BEN-JLB Document 132-4 Filed 12/01/22 PageID.17167 Page 4 of 17

1 which they are designed. The State also argues that if the weapon can function in the  
2 absence of the magazine, then the magazine is an accessory. As a single-shot, that is  
3 correct, it could function – but not as intended. Consider such logic applied to a  
4 pickup truck. If a rear tire is removed, the truck can still be driven, but not as intended.  
5 A Glock pistol requires only the slide and barrel to fire a round, but that would not  
6 make the Glock's frame a mere accessory. The Glock is just one example of many  
7 firearms that doesn't require all of its parts to be present to discharge a cartridge. An  
8 expansive definition of "accessory" is thus a serious threat to Second Amendment  
9 rights. If by designating a part an "accessory" it can be banned, taxed, or otherwise  
10 restricted, there is no protection for the complete firearm.

11       10. An expert for the defense (Ryan Busse) makes the related point that large  
12 capacity magazines are not typically manufactured by the same company that  
13 produces the firearm itself and therefore magazines should be considered an  
14 accessory. Again, I am the historian for a British company whose two main product  
15 lines were developed and patented in the third quarter of the 19<sup>th</sup> century. Do we  
16 produce all the key parts of those guns and rifles? – no. Could we? – yes. Some key  
17 parts, including the receiver, are precision machined by a specialty manufacturer for  
18 us. That does not mean our receivers are mere "accessories". The use of outside  
19 vendors is simply a good business practice to produce the best possible product in the  
20 most cost-effective manner.

21       11. AR-type magazines have been manufactured for over 60 years.  
22 Production totals aren't known but given the number of rifles and pistols that accept  
23 AR or other magazines capable of holding over ten rounds, it certainly wouldn't be  
24 unreasonable to put the total between 500 million and 1 billion. They are undoubtedly  
25 in common use by millions of Americans for lawful purposes including self-defense,  
26 sports shooting, competitions, hunting, and other similar purposes.

27       ///  
28       ///

4  
DECLARATION OF STEPHEN HELSLEY

17cv1017

Case 3:17-cv-01017-BEN-JLB Document 132-4 Filed 12/01/22 PageID.17168 Page 5 of 17

1      12. I have received no remuneration for any work done in this matter.

3 I declare under penalty of perjury that the foregoing is true and correct.

4 | Executed within the United States on November 30, 2022.

  
Stephen Helsley

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DECLARATION OF STEPHEN HELSLEY

17cv1017

Case 3:17-cv-01017-BEN-JLB Document 132-4 Filed 12/01/22 PageID.17169 Page 6 of 17

# EXHIBIT 10

**ER\_851**

**Expert Witness Report of Stephen Helsley**

*Duncan, et al. v. Becerra, et al.*  
United States District Court (S.D. Cal.)  
Case No: 3:17-cv-01017-BEN-JLB  
November 30, 2022

**I. INTRODUCTION**

Counsel for plaintiffs in *Duncan v. Becerra* (E.D. Cal. Case No. 3:17-cv-01017-BEN-JLB) have asked me to offer an opinion regarding this case. This report sets forth my qualifications, opinions, and scholarly foundation for those opinions.

**II. BACKGROUND & QUALIFICATIONS**

I am Stephen Helsley, a retired peace officer from the California Department of Justice (DOJ). The bulk of that career was in drug enforcement. The last three positions I held were Chief of the Bureau of Narcotic Enforcement, Chief of the Bureau of Forensic Services and, finally, Assistant Director of the Division of Law Enforcement. As Assistant Director, I was responsible for the department's criminal, civil, and controlled substance investigations as well as law enforcement training, intelligence gathering and our forensic laboratory system. In my executive level positions, I had occasion to review special agent-involved shootings and a wide range of homicides involving firearms.

I was the DOJ's principal firearms instructor for many years, and I am an FBI-certified range master. I also participated in the firearm training that was part of the FBI National Academy Program in Quantico, VA. I am a member of the American Society of Arms Collectors and a technical advisor to the Association of Firearm and Tool Mark Examiners. For the past 24 years, I was first a state liaison and, then later, a consultant to the National Rifle Association.

I have co-authored five books on firearms and have authored or co-authored more than fifty firearm-related articles for U.S. and Russian journals. Throughout my adult life, I have been an active participant in handgun, rifle, and shotgun competitions. I have also been a firearm collector and ammunition reloader since the early 1960s.

Finally, I am a collector of firearm-related books—of which I have approximately three thousand. Included in my book collection are approximately 50 different issues of *Gun Digest*, the earliest of which is from 1944. It is a standard resource that is widely used by gun dealers and buyers alike. *Gun Digest* has traditionally provided a comprehensive overview of the firearms and related items available to retail buyers.

The combination of my consulting work, writing and free time activities puts me in constant contact with gun stores, shooting ranges, gun shows and gun owners. I am also in frequent contact with retirees from DOJ and other law enforcement agencies.

I have qualified as an expert in both criminal and civil matters.

#### A. Published Articles

In the past ten years, I have written or contributed to the following published articles and opinion editorials:

##### 1. Articles

- *Of Birmingham and Belgium*, Double Gun Journal, vol. 18, iss. 2 (2007).
- *The .470 Nitro Express*, Sports Afield (June/July 2007).
- *Readings on the Roots of the .410*, Shooting Sportsman, Nov./Dec. 2007.
- *Hunting in Wales*, Hunting and Fishing (Russia), Dec. 2007.
- *A Pair for a Pair of Friends*, Shooting Sportsman, March/April 2008.
- *A Welsh Fantasy*, Shooting Sportsman, July/Aug. 2008.
- *A Maine Gun Goes Home*, Shooting Sportsman, Sept./Oct. 2008.
- *The Pin Fire Comes Home*, Libby Camps Newsletter, Winter 2008.
- *John Rigby & Co.*, Hunting and Fishing (Russia), July 2008.
- *The All-American Double Rifle*, Safari, Sept./Oct. 2008.
- *Eastern Oregon Odyssey*, Shooting Sportsman, Nov./Dec. 2008.
- *Rigby Marks 275<sup>th</sup> Anniversary*, Safari, Nov./Dec. 2009.
- *Finding Papa's Guns*, Shooting Sportsman, March/April 2010.
- *The Searcy Stalking Rifle*, Safari, May/June 2010.
- *The Ruggs Riders*, Shooting Sportsman, July/Aug. 2010.
- *Searcy Brings Back the Rising-Bite*, Shooting Sportsman, Sept./Oct. 2010.
- *John Rigby & Co.*, African Hunting Gazette, Fall 2010.
- *The Ageless .416 Rigby*, Safari, Nov./Dec. 2012.
- *J. P. Clabrough*, Shooting Sportsman, March/April 2015.
- *The Mystery of Hemingway's Guns*, Friends and Neighbors, Summer 2015.
- *The Enigma of Hemingway's Guns*, Master Gun (Russia), Sept. 2015.
- *The Mystery of Hemingway's Guns*, CRPA Firing Line, Sept./Oct. 2015.
- *Pistols at Dawn*, CRPA Firing Line, Jan./Feb. 2016.
- *The Silver Star*, CRPA Firing Line, Jan./Feb. 2016.
- *Women Guns & Politics*, CRPA Firing Line, March/April 2016.
- *Hunting the Big Mouse*, CRPA Firing Line, Sept./Oct. 2016.
- *Do Guns Make Heroes? The Congressional Medal of Honor*, CRPA Firing Line, Nov./Dec. 2016.
- *Thumbs-Up Guns*, Shooting Sportsman, Jan./Feb. 2017.
- *Is Your Gun Safely Stored? (Part 1)*, Friends and Neighbors, Summer 2017.
- *History of William Powell and His Patents*, Master Gun (Russia), Aug. 2017.

- *Guns from San Francisco and Birmingham*, Master Gun (Russia), Oct. 2017.
- *Is Your Gun Safely Stored? (Part 2)*, Friends and Neighbors, Autumn 2017.

## 2. Opinion Editorials

- *It's About Time: State has Eroded Gun Owner's Rights*, Sac. Bee (July 4, 2010).
- *Nevada Views: Is Gun Registration Worth Cost?*, Nev. Rev. J. (Sept. 16, 2012).
- *Gun Roundup Program Has Too Many Flaws*, Sac. Bee (May 3, 2013).

## B. Expert Witness History

In the past four years, I have not been deposed in or testified at trial as an expert witness.

## III. COMPENSATION

I am not being compensated for my work on this report.

## IV. ASSIGNMENT

Plaintiffs' counsel has asked me to provide opinion on the historical existence and prevalence of firearms and/or magazines capable of holding more than ten rounds of ammunition and the reasons law-abiding Americans, including law enforcement and private citizens, so often select such items.

Counsel has also asked that I provide opinion on the utility of firearm magazines with the ability to accept more than ten rounds of ammunition in self-defense, as well as the impact of ten-round magazine limitations on law-abiding citizens.

## V. OPINIONS & ANALYSIS

### 1. Magazines over ten rounds are, and have historically been, a common choice for self-protection for use in both rifles and handguns.

The standard magazine for a given firearm is one that was originally designed for use with that firearm, regardless of whether its capacity is six, ten, fifteen, or twenty rounds. Various popular handgun models originally came from the manufacturer standard, free from artificial influences like laws restricting capacity, with magazines exceeding ten rounds. Examples include, but are in no way limited to, the Browning High Power (13 rounds) c.1954, MAB PA-15 (15 rounds) c.1966, Beretta Models 81/84 (12/13 rounds) c.1977, S&W Model 59 (14 rounds) c.1971, L.E.S P-18 (18 rounds) c.1980 aka Steyr GB, Beretta Model 92

(15 rounds) c.1980s, and Glock 17 (17 rounds) c.1986. I know there to be many more examples not listed here.

Firearms with a capacity exceeding 10-rounds date to the ‘dawn of firearms.’ In the late-15th Century, Leonardo Da Vinci designed a 33-shot weapon. In the late 17th Century, Michele Lorenzoni designed a practical repeating flintlock rifle. A modified 18th Century version of Lorenzoni’s design, with a 12-shot capacity, is displayed at the NRA’s National Firearms Museum. Perhaps the most famous rifle in American history is the one used by Lewis and Clark on their ‘Corps of Discovery’ expedition between 1803 and 1806—the magazine for which held twenty-two .46 caliber balls.

Rifles with fixed magazines holding 15-rounds were widely used in the American Civil War. During that same period, revolvers with a capacity of 20-rounds were available but enjoyed limited popularity because they were so ungainly.

In 1879, Remington introduced the first ‘modern’ detachable rifle magazine. In the 1890s, semiautomatic pistols with detachable magazines followed. During WWI, detachable magazines with capacities of 25 to 32-rounds were introduced. As those magazines protruded well below the bottom of the pistol’s frame, they weren’t practical for use with a belt holster—and by extension concealed carry for self-defense.

In 1935, Fabrique Nationale introduced the Model P-35 pistol with its fully internal 13-round magazine. It would become one of the most widely used military pistols of all time. During WWII, magazine capacity for shoulder-fired arms was substantially increased while most pistols (excluding the P-35) remained at 10-rounds or less. In the mid-1950s the P-35 was rebranded the High Power and imported to the US.

This transition of a firearm from military to civilian use for sport or self-defense is very common. The standards of WWI—the 1903 Springfield rifle and the Colt M1911 pistol are but two of many examples. Civilian sales of both increased after the war as a result of the training “doughboys” received before going to France. The Springfield would become the standard for both rifle hunting and target competition. Likewise, the M1911 Colt pistol was a target-shooting standard for a half-century or more and popular for self-defense.

Between the two world wars, double-action semiautomatic pistols like the Walther PPK and P-38 were introduced. The double-action feature allowed the first shot to be fired in a manner similar to a revolver. Law enforcement agencies in the United States had traditionally used revolvers. However, in the early 1970s, a confluence of events changed that: training funds became widely available and so did the first double action semiautomatic pistol (the S&W M59) with a 14-round magazine. Soon major agencies were transitioning to the M59 and the legion of

other makes that followed—CZ, Colt, HK, Sig-Sauer, Glock, Beretta, Ruger, Smith & Wesson, etc. Pistols with magazine capacities as large as 19-rounds quickly replaced the six-shot revolver.

Law enforcement demand for the new generation of semiautomatic pistols helped create an increased demand in the civilian market. Comparing 1986 and 2010 handgun sales, one can see evidence of that change. According to the Bureau of Alcohol Tobacco Firearms and Explosives, in 1986, 663,000 pistols were sold in the United States versus 761,000 revolvers. In 2010, revolver sales had dropped to 559,000, while pistol sales had grown to 2,258,000. See United States Department of Justice, Bureau of Alcohol, Tobacco, Firearms and Explosives, *Firearms Commerce in the United States, Annual Statistical Update* (2012), available at <http://www.atf.gov/files/publications/firearms/050412-firearms-commerce-in-the-us-annual-statistical-update-2012.pdf>. The result of almost four decades of sales to law enforcement and civilian clients is millions of semiautomatic pistols with a magazine capacity of more than ten rounds and likely multiple millions of magazines for them. My associates who have such pistols also have a considerable number of spare magazines for them. In my case, I have one 19-round and eight 17-round magazines for my Glock.

The on-duty, uniformed police officer generally will be armed with a service pistol containing a detachable magazine holding more than ten rounds, and generally two spare magazines holding more than ten rounds on the uniform belt. The clear majority of California law enforcement officers carry pistols with double-stack magazines whose capacities exceed those permitted under California Penal Code section 32310.

The home-owner and the concealed weapon permit holder want a pistol that can hold significantly more cartridges than a revolver for the same reason a law enforcement office or soldier wants one—to increase his or her chances of staying alive. For virtuous citizens buy their guns to protect themselves from the same criminals that police carry guns to protect the citizens, the public, and themselves from. For this reason, armed citizens have historically modeled their choice of firearms on what police carry.

2. *Limiting the law-abiding citizen to a magazine of ten rounds limits their ability to protect themselves from violent criminals in certain situations. Such limits on magazine capacity are likely to impair the ability of citizens to engage in lawful self-defense in those crime incidents necessitating that the victim fire many rounds to stop the aggressive actions of offenders, while having negligible impact on the ability of criminals to carry out violent crimes.*

Based on my experience with and understanding of the customs and practices of citizens licensed to carry guns in public, individuals often carry *only*

the gun, without spare ammunition or magazines. Similarly, most plainclothes police officers do not find it practical to carry multiple handguns.

Likewise, the average homeowner who keeps a defensive firearm is unlikely to have time to gather spare ammunition or magazines. Rather, they are generally limited to one firearm and its magazine capacity. For the homeowner who keeps a defensive firearm and is awakened in the night by an intruder is most unlikely to have time to gather spare ammunition. The sudden and unpredictable nature of such attacks, and their occurring in relatively confined spaces, generally prohibits the gathering of multiple firearms or magazines. Ideally, one hand would be occupied with the handgun and the other with a telephone to call the police. Assuming an individual even had time for a magazine change, most people do not sleep with firearms or magazines attached to their bodies or wearing clothing that would allow them to stow spare magazines or ammunition on their person. They would have only what was in the firearm.

The off-duty officer and the private law-abiding citizen are thus unlikely to have much, if any, spare ammunition on their person or elsewhere readily accessible. They are not likely to be wearing body armor, nor to be in reach of a spare, loaded rifle or shotgun. Their only communication to potential backup will be by phone, relayed through Police Dispatch to responding officers. Thus, for them, the ability to have a pistol already loaded with a significant amount of ammunition is all the more important.

Uniformed police officers who are traditionally armed against the same criminals, on the other hand *are* normally wearing body armor. They generally have immediate access to a loaded shotgun and/or loaded patrol rifle with magazines holding more than ten rounds in the patrol car. And they will have instant radio access to dispatch and fellow officers if backup help is needed. Further, they will generally have both a loaded gun *and* two additional magazines. Each of those magazines would generally hold 17 rounds of 9mm or 15 rounds of .40 caliber cartridges. Collective law enforcement experience has determined this to be critical to allowing the officer to survive a gunfight with armed criminals.

What's more, the average citizen is not trained like law enforcement personnel and is generally not as readily prepared for combat with an armed criminal. As noted, they are likely to have a single firearm loaded with a single magazine available, and they are more susceptible to the psychological effects that naturally occur when faced with the threat of deadly violence and tend to deprive one of the focus and clarity of mind necessary to make accurate shots.

For these reasons, having a magazine over ten rounds at one's disposal certainly could make a difference in self-defense situations, and likely would during home invasions or when facing armed attackers. In my opinion, law-abiding citizens will thus be at a disadvantage in such situations if California enforces its ban on the possession of magazines over ten rounds.

Criminals bent on causing harm, on the other hand, are not likely to be meaningfully affected by California's magazine restrictions. Even assuming they were impeded from obtaining magazines over ten rounds by Penal Code section 32310, they could simply arm themselves with multiple weapons and/or magazines, and they often do. Criminals have time to assess and plan shootings, whereas victims do not. Indeed, it is the attacker who chooses when, where, how, and whom to attack. So, the attacker is not as burdened by the surprise and shock that the victim is and is generally prepared for the confrontation with several firearms and a substantial amount of ammunition.

The virtuous citizen cannot practically be expected to have accessible multiple guns, magazines, or spare ammunition at a moment's notice. The victimized citizen is the one who is, therefore, most deleteriously impacted by the magazine capacity limitation. If he or she must use the gun to protect self and family, they will most likely have only the ammunition in the gun with which to fend off determined, perhaps multiple, attackers.

Supporters of the magazine capacity limitation may point to some firearm expert who is comfortable with an eight- or nine-shot pistol, or even a five- or six-shot revolver. It should be noted, however, that the operative term there is "expert." The individual who has spent a lifetime training in shooting, and may fire hundreds or even thousands of shots on the range per month, has developed a level of skill and confidence that is not practical to expect from the average police officer or the average law-abiding citizen who keeps a firearm in the home or on his person for protection of self and family.

Finally, it is worth noting that it is difficult to say exactly how many private citizens have fired more than ten rounds in a self-defense shooting, because the number of rounds fired in such cases is very often an omitted fact in written accounts of such defensive gun uses. Often the accounts just say, "multiple shots fired." That could mean more or less than ten. This does not seem to be the case with shootings involving police officers, for which, the number of shots fired is generally documented. In my experience researching such shootings, officers often fire more than ten rounds. And cases where an individual officer fired less than ten rounds, but where multiple officers were shooting, can be fairly characterized as involving more than ten rounds, if the multiple officers involved fired over ten rounds in aggregate. Officer-involved shootings are relevant in evaluating private citizen shootings, for the simple reason that private citizens arm themselves for protection against the same criminals the police are armed to deal with.

3. *A firearm equipped with a magazine capable of holding more than ten rounds is more effective at incapacitating a deadly threat and, under some circumstances, may be necessary to do so.*

Gunfights frequently involve a lot of "missing." This can be the result of improper aim or impact with barriers such as vehicles or walls. One would be hard

pressed to find someone who had been in a gunfight that complained about having too much ammunition.

Some believe that anyone defending themselves can just “shoot to wound.” Those who grew up in the 1950s likely watched Roy Rogers shoot the gun out of an evildoers’ hand or—if things got really serious—let loose a grazing wound to the arm to settle matters. Such ideas are a fantasy. Equally as silly is the well-known ‘fact’ that a bullet from a .45ACP cartridge will knock someone to the ground no matter where it strikes them.

The notion that a bullet can “knock-down” a person is a largely Hollywood-inspired myth. Most of us learned in school about Sir Isaac Newton’s *Third Law of Motion* that states—“For every action, there is an opposite and equal reaction.” Put another way: if the recoil of the firearm doesn’t knock you down, neither will the impact of the bullet. Bullets can penetrate skin, cut arteries, brake bones or interrupt nerve function to accomplish what is generally described as “stopping power.” A bullet that severs the spine or strikes a certain area of the brain will almost certainly stop an attacker instantly. Bullet design and/or increased velocity may improve performance, but placement is still the most critical factor.

A hit, or even multiple hits, to less vital areas of the body may allow an attacker to continue the assault. This phenomenon is extensively documented in the citations for American heroes who were awarded the Congressional Medal of Honor. Many of these men continued to fight after suffering multiple gunshot wounds, being struck by shrapnel or having an arm or leg severed. *See, e.g., The Congressional Medal of Honor, The Names, The Deeds* 28-29, 52-53, 284-85 (Sharp & Dunnigan 1984). A fighter who has overcome fear and is motivated to continue an attack can be difficult to stop. In the infamous 1986 FBI shoot-out with two Florida bank robbers, one of the suspects, Michael Platt, sustained 12 gunshot wounds before dying. Jamie Frater, *Top 10 Most Audacious Shootouts in US History*, Listserve (October 14, 2009), <http://listverse.com/2009/10/14/top-10-most-audacious-shootouts-in-us-history/>.

“Knockdown” and “Stopping Power” are things I know from personal experience. During my early years as a narcotic agent with the California Department of Justice, I was conducting an undercover investigation of a significant heroin dealer. After purchasing an ounce and a half of heroin from him and the arrest was initiated, he shot me with a .45 first breaking my left arm and severing an artery (Note: I wasn’t “knocked down”) and then bouncing another round off my spine that exited my right leg. From a prone position, I returned fire at the suspect who was mostly concealed by the trunk of his car. My shots that struck the vehicle failed to penetrate sufficiently to reach him. In the exchange that followed I had another round pass through my right leg, while another entered my left side and lodged in the disc between L3 and L4—where it remains today. Having emptied the 8 rounds in my pistol, I tried to reload. However, with a broken arm and temporary paralysis from the waist down, I was unable to reach

my spare magazine in my left rear pants pocket. Fortunately, at that time the suspect quickly surrendered to my converging surveillance team. Very little pain was initially associated with my wounds and I could have “fought on” if more ammunition had been available. A total of 18 rounds were fired.

Four years later, I was making an undercover cocaine purchase with a new member of my team. I had involved myself to evaluate his performance. The three suspects, two of whom were armed (initially unbeknownst to us) had decided that robbery was a better option than delivering the cocaine. The junior agent was taken hostage and was being held in the state undercover car with a sawed-off rifle to the back of his head and a revolver held against his right side. I was across the street in another undercover car with the money the suspects wanted. I informed the surveillance team that I was going to approach the other vehicle to see what I could do. When I got to the car it was difficult to determine what was happening, as it was a dark, rainy night. I told the agent to exit the vehicle and as he opened the car door and dived out, two shots were fired at him—both missed. I returned fire at the area of the muzzle flash inside the car. Of the eight rounds I fired, the automobile glass defeated most. However, one .45 bullet hit the suspect holding the rifle, causing him serious internal injuries. The suspect with the revolver came out of the passenger door and was struck through the shin with a .45 bullet from a member of the surveillance team who had quietly closed-in on the vehicle. After a short pause the suspects were ordered out of the vehicle. Both of those with gunshot wounds came out fighting. A flashlight to the chin produced the ‘stopping power’ for the suspect with the internal wound. The suspect with the leg wound was unaware of his injury until he saw the massive blood loss—whereupon he exclaimed “I’m bleeding” and passed out. Twenty-eight rounds were fired into the vehicle with only two hits. For my actions in this incident I was awarded the department’s Medal of Valor.

The “take away” from these incidents is that serious bullet wounds aren’t necessarily incapacitating and that gunfights can require lots of ammunition.

## VII. REFERENCES

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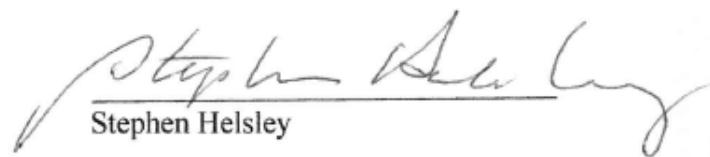
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### VIII. CONCLUSION

It is clear to me from my collective experiences and from the analysis described above that firearms and magazines with ammunition capacities exceeding ten rounds have existed and have been in use since at least the 18th Century.

It is also clear that Americans commonly choose and use magazines capable of holding more than ten rounds of ammunition for lawful purposes, including self-defense.

Dated: October 6, 2017



Stephen Helsley

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**CERTIFICATE OF SERVICE**  
**UNITED STATES DISTRICT COURT**  
**SOUTHERN DISTRICT OF CALIFORNIA**

Case Name: *Duncan, et al. v. Becerra*  
Case No.: 17-cv-1017-BEN-JLB

**IT IS HEREBY CERTIFIED THAT:**

I, the undersigned, declare under penalty of perjury that I am a citizen of the United States over 18 years of age. My business address is 180 East Ocean Boulevard, Suite 200 Long Beach, CA 90802. I am not a party to the above-entitled action.

I have caused service of the following documents, described as:

**DECLARATION OF STEPHEN HELSLEY IN SUPPORT OF PLAINTIFFS'  
SUPPLEMENTAL BRIEF; EXHIBIT 10**

on the following parties by electronically filing the foregoing on December 1, 2022, with the Clerk of the District Court using its ECF System, which electronically notifies them.

Rob Bonta  
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I declare under penalty of perjury that the foregoing is true and correct.  
Executed on December 1, 2022, at Long Beach, CA.

*Laura Palmerin*  
Laura Palmerin

## CERTIFICATE OF SERVICE

17cv1017